ANOTHER **GOODYEAR DISTRIBUTOR** FOLLOWS THROUGH!

Extends slurry-line life by 24 times

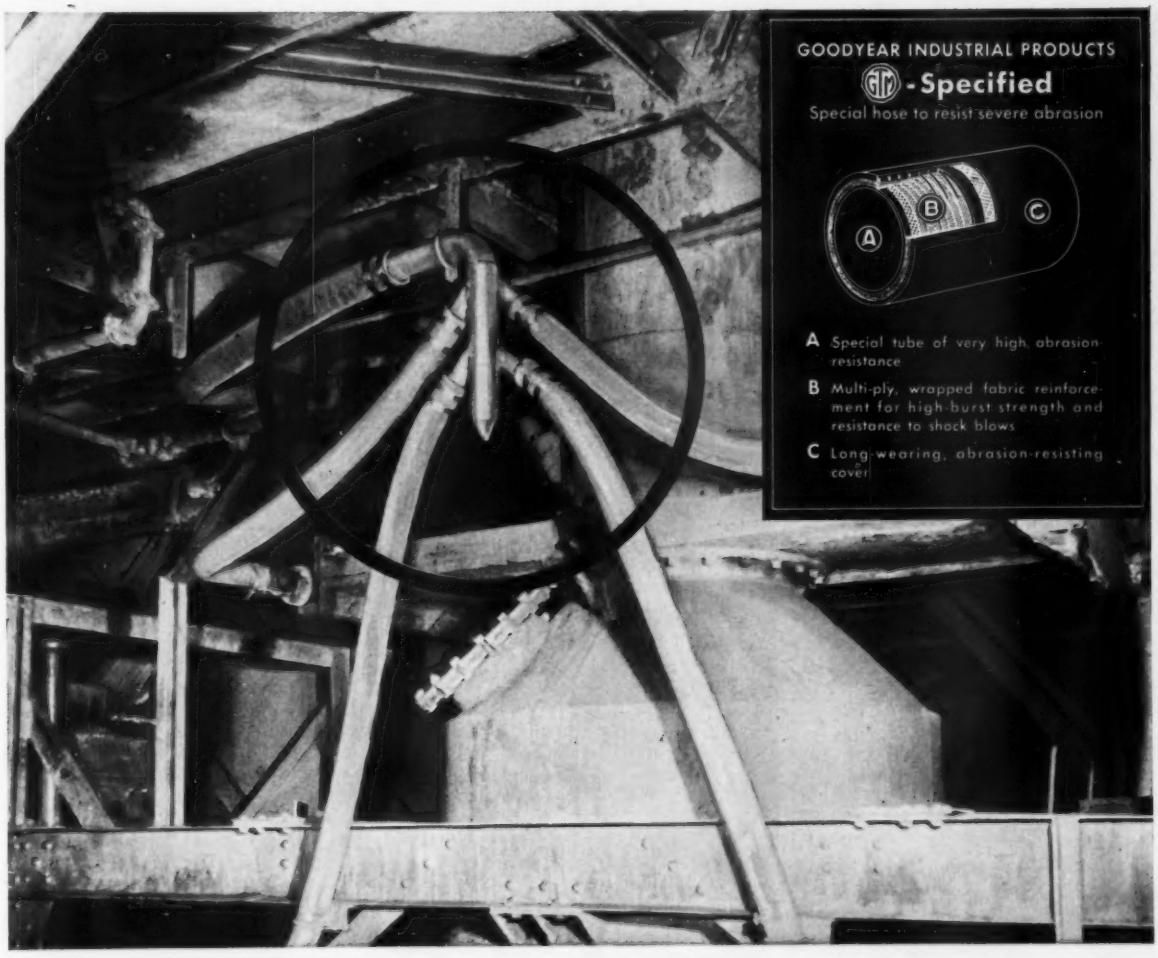
A Goodyear Distributor and a G.T.M. – Goodyear Technical Man – are quite a team. When they get together, tough problems fade – fast.

Take the trouble with the coal-dust slurry line at this Pennsylvania coal-cleaning plant. Even the heaviest steel pipe was quickly eaten through. In fact, 71 days was the longest service. Then there'd be another shut-down – another expensive replacement.

But that was before the Goodyear Distributor-G.T.M. team took over. Their suggestion: a special abrasion-fighting hose, engineered for just such operations. Result: that hose has done the job for more than 4 years at last report – has outperformed the heavy pipe 24 times over.

And that's typical. Time after time – in plant after plant – the Goodyear team has proved that years of trouble-free service is only a matter of the *right* recommendation of the *right* industrial product.

So next time you have a profit-eating situation like this, check it with your Goodyear Distributor and his G.T.M. You'll find them listed under "Rubber Products" or "Rubber Goods" in the Yellow Pages. Or you can write Goodyear, Industrial Products Division, Akron 16, Ohio.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Special hose to resist severe abrasion
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B
C
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GOODYEAR

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

New Appointment at Armco Steel

Samuel P. Carter has been appointed chief engineer of the West Virginia Coal Mines Division of Armco Steel Corporation, Middletown, Ohio.

He studied electrical engineering at Virginia Polytechnic Institute after attending William and Mary College. Following graduation, he joined Armco in 1934 as an electrician at the Nellis Mine. In 1941, he was made inside maintenance foreman. In 1946, following several years in the U. S. Air Force, he returned to the Coal Mines to become power engineer. Later the same year he was advanced to maintenance supervisor. In 1949, he was promoted to superintendent of maintenance.

Cooling Tower Care

RECIRCULATION HAS long been recognized as a problem in the design and testing of mechanical draft water-cooling towers. In an effort to evaluate this problem, a sub-committee was formed in 1951 for the purpose of measuring the recirculation in mechanical draft towers and determining its influence upon the performance of the equipment.

The results of this seven-year research program are published in the bulletin PFM-110. The bulletin explains the "recirculation factors" and describes recommended procedures for their application. Suggested tower

Dick Morris Speaks Before the San Jacinto Chapter of NSPE

"Russia—The Country and People Behind the Current Crisis," was discussed by Dick Morris, Editorial Director, Plant Engineering, at the last meeting of the San Jacinto Chapter of the Texas Society of Professional Engineers, the largest chapter of the NSPE. Above, Dick Morris, left, discusses last minute meeting arrangements with Jim Montgomery, of Tidewater Oil Co., and chairman of Chapter activities. The meeting was presided over by Carrington Mason, of the Houston Natural Gas Co., and president of the San Jacinto Chapter.

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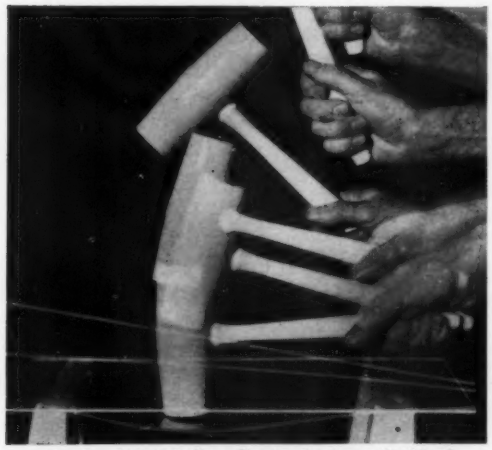

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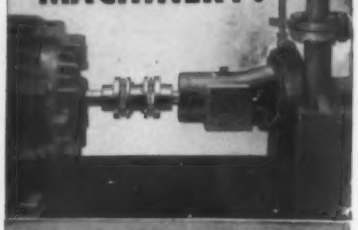

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'ROUND ABOUT

orientation for minimizing recirculation and the effects of one tower upon an adjacent tower are also diagrammed.

Copies of this bulletin, Recirculation, are available from the Cooling Tower Institute, 420 Emerson St., Palo Alto, California, at one dollar per copy.

Appointment at Chrysler Corp.

Harry R. Bentley was named plant manager of Chrysler Corporation's Mound Road Engine plant in Detroit, Michigan.

He joined the company in 1942 as supervisor of construction engineering at the Evansville, Ind., plant. In 1944, he was transferred to the X-100 plant (Division of Oak Ridge Atom Bomb Plant) as chief layout engineer. Since 1945, he has served successively as an assistant plant engineer, plant engineer, division production planning manager and, since November, 1956, he had been plant manager of the Trenton Engine plant.

Plant Engineering Receives Public Interest Award

PLANT ENGINEERING recently received the following letter from Howard Pyle, President, National Safety Council:

"It is my pleasure to inform you that your organization has been voted the National Safety Council's Public Interest Award for 1958.

"We here at the Council know all you have been doing for safety and are delighted that the judges agreed.

"I am sure you feel, as we do, that there is another dividend as a result of your safety efforts—the knowledge that you have helped prevent many accidents.

"Many thanks for your support."

The editors of PLANT ENGINEERING are pleased to receive this honor and to know that they have played a part, through articles in the magazine, in helping prevent industrial accidents.

Need an Industrial Instrument?

PURCHASE OF industrial instruments —some highly specialized—can prove extremely costly unless used over long periods. To alleviate this situation, industry can now avail itself of the rental service offered by General Electric Company.

The company has established a pool of 13,000 instruments for loan to business, industry and individuals. For bakeries there are special recorders; for manufacturers there are leak detectors, temperature gages, flowmeters and pressure recorders; for laboratories there is a host of instruments for measuring electrical or mechanical quality.

For further information on this rental program, write to General Electric Company, Schenectady, N.Y., requesting Bulletin No. GEA-6829.

Maintenance Engineers Attend Seminar on Packings and Seals

Thirty-two plant engineering operation and maintenance supervisors from 24 chemical and petroleum companies throughout the country recently attended a five-day seminar at Crane Packing Company's home offices in Morton Grove, Illinois. Purpose of this seminar was to provide information and recommendations on improved usage of mechanical packings and mechanical seals. Meeting was highlighted by an exchange-of-ideas discussion and actual demonstrations.

New addition to the line of Grinnell malleable iron hangers

Grinnell's Malleable Iron G Clamp Hanger is a new addition to the line of Grinnell Pipe Hangers and Supports, the most complete line of any manufacturer. This hanger answers a long-felt need for support of pipe or conduit (up to 4 inches in size) where application can be made directly under structural steel.

The saddle of the Grinnell G Clamp swivels. This permits pipe or conduit to be installed either parallel or traverse to the beam axis. Separate beam clamp, rod and pipe clamp are not required, thus saving cost of supports and installation time.

Grinnell G Clamps are made of malleable iron with a ribbed design for added strength. The set screw has a hardened steel cup point for clamping rigidly to beam. Full thread engagement is provided by the tapping through the upper jaw. Approved by Factory Mutual Laboratories for use on fire protection and plumbing systems. Especially recommended for hanging conduit. Maximum recommended loads are from 210 to 450 pounds, for the smallest to the largest sizes, with a safety factor of 5.

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- Safety factor of at least 5
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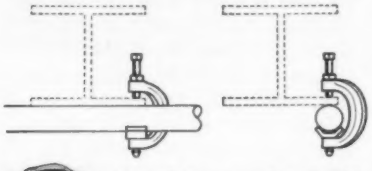

Saddle swivels, permitting suspension of the pipe or conduit at any angle in a plane parallel to the face of the supporting flange.

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HELPFUL WATER CONDITIONING DATA FROM BETZ

THE CARE AND OPERATION

■ Exchange materials should be handled with care to maintain maximum efficiency and longer service life.

With the increasing use of zeolite softeners and demineralizers in industry, the problem of keeping these units free from fouling confronts more owners and operators all the time. Rapid developments in the ion exchange materials themselves continue to stimulate their use. The economic advantage of softening and demineralizing can be rapidly lost, however, if the units are not operated efficiently.

Bacterial Fouling

Municipal and industrial water supplies contain organic and mineral matter, some of which is filtered out when the waters are passed through zeolite softeners. The bacteria counts of many raw supplies are very high, particularly surface waters that are not prepared for human consumption. The bacteria encountered are chiefly soil organisms including such types as sulfate reducing bacteria, iron bacteria and various spore formers. Coliform bacteria are found occasionally in private well supplies.

Zeolite beds, in general, cannot support growth of bacteria in themselves. The organic matter that is filtered out by the zeolite, however, provides a source of food for reproduction of bacteria. Many times the pH, temperature and other environmental conditions in the softener are ideal for stimulating growth. Water with a low bacteria count can become heavily contaminated in passing through a badly fouled softener.

Bacteria produce slime which is voluminous and adherent and cannot always be removed by the action of regeneration and backwashing. The growths of slime and bacteria can impart objectionable taste and odor to the water. Even when the taste and odor are not objectionable, the slime can cover a significant portion of the zeolite so that regeneration is partially ineffective.

Surface supplies, to a greater extent than well supplies, contain high molecular weight organics. The organics, besides acting as food for bacteria can be of the type that slowly diffuse into the structure of the zeolite. Because the outward diffusion will be just as slow, the normally short regeneration period usually will not remove this type of fouling. The organics, in badly infested water, can build up and result in deterioration of some zeolites.

Other Deposits

Iron, aluminum, and manganese deposits are often encountered in zeolite softeners. Deposits of this type coat and penetrate into the zeolite particles reducing the exchange capacity of the unit. The coated particles can gradually increase in size resulting in large, hard masses and channeling of the softener bed. The channeling is very undesirable since it permits leakage of hardness during a softener run. In addition, the fouling becomes progressively worse as the effectiveness of the backwash is decreased.

At one particular plant, short softening runs developed after the zeolites had been in use for several years. Inspection revealed that the top six to eight inches of the softener bed was almost a completely solid mass. To break through the solid top layer a heavy crow bar was necessary. Below the solid layer large round balls, some eight inches in diameter, were found. Very little of the bed was in its original condition and it was difficult to believe that any softening could be accomplished by the unit. This case is undoubtedly an extreme one where the combination of a poor quality influent water and insufficient backwash rate made a premature replacement of the zeolite necessary.

Iron is probably the chief mineral enemy of zeolite material. Iron exists in various forms. In water supplies, such as deep wells, where oxygen is not present, iron exists in the ferrous state. In this form, iron is very soluble and can be exchanged as readily as divalent calcium and magnesium (the common hardness ions) in a softener.

If the water supply is aerated before softening, ferrous iron is oxidized to the insoluble ferric (trivalent) form. When ferrous iron is oxidized and there is insufficient time for its removal prior to softening, the insoluble ferric iron will not be exchanged by a zeolite but will be filtered out. For this reason, where it is necessary to soften a well supply containing iron, the softener should be located near the well and every effort made to keep air from entering the system. Preventing air leakage is sometimes impossible and it is often safer and cheaper to remove iron in an aerator or a special iron removal filter before softening.

Operational Factors

Mineral and bacterial accumulations cause an increased pressure drop across a softening unit. Flow rates can be decreased and pumping power requirements can increase. If fouling material is not removed at regular intervals, the exchange capacity of the softener can be permanently decreased. Increased quantities of regenerant are then necessary. The length of time required for backwashing and the quantity of backwash water is often increased. Rinsing is less effective in a badly fouled softener.

It should be kept in mind that a heavier fouling potential is imposed on softeners as the exchange capacities of the synthetic zeolite materials increase. That is, a unit of high capacity exchange resin generally filters a great deal more water between backwashes than the same unit of greensand. It becomes increasingly important, therefore, that close attention be given to the backwash and regeneration operation. If the period between regenerations is more than 24 hours and the quality of the influent water is inferior, or pressure drop across the unit is higher than normal, backwashing at more frequent intervals without regeneration will prove helpful.

Fouling of the softener can and often does lead to other disadvantages as well. Besides shorter softener runs, higher salt consumption and greater loss of zeolite mineral, the quality of the effluent will decrease with time. Where the softened water is used as makeup to boilers, internal treatment consumption will be

TABLE I	CHARACTERISTICS OF CATION EXCHANGE MATERIALS			
Type of Material	Capacity gr. per cu. ft.	Regenerant lb./kgr.	Operating pH	Range Temp. °F.
SILICIOUS BASE				
Processed Greensand	2,500- 3,000	0.35-0.50	6.0- 8.4	135 Max.
High Capacity Greensand	5,000- 5,500	0.35-0.50	6.5- 8.1	110 Max.
Synthetic Gel	7,500-10,000	0.33-0.50	6.8- 8.2	100 Max.
ORGANIC				
Sulfonated Coal	6,000- 7,000	0.45	5.0-10.0	135 Max.
Polystyrene Resin	20,000-30,000	0.25-0.50	5.0-11.0	250 Max.

increased, a heavier accumulation of sludge will develop and increased blowdown rates will be necessary. Very frequently, excessive periods of rinsing must be used before a good quality effluent is produced, which is low in both hardness and chlorides.

OF ZEOLITE SOFTENERS

Tables I and II list the common types of exchange materials used in zeolite softeners together with their exchange capacity and other operating characteristics. This information can be used as a guide in checking the operation of the zeolite unit to determine whether its efficiency has decreased. A daily log on softener operation should be maintained to accumulate the necessary data to permit checking of the softener efficiency.

TABLE II	FLOW RATES IN GALLONS PER SQ. FT. PER MINUTE			
	Backwash Rate	Regen. Rate	Rinse Rate	Oper. Rate
SILICIOUS BASE				
Processed Greensand	9	2.5	5	5
High Capacity Greensand	9	2.5	5	5
Synthetic Gel	4-6	2.5	5	5
ORGANIC				
Sulfonated Coal	6	1.5-3.0	2.5-6	6
Polystyrene Resin	6	2.5	2.5-7	7

The anticipated loss of exchange material is a maximum of 3% per year due to mechanical breakdown. With fouling this loss can be seriously increased. While the zeolite mineral is not a capital expense but rather a maintenance item, it nevertheless is important to minimize the cost of operation and a comprehensive program should be followed to assure minimum loss of resin, maximum salt efficiency and the continuous production of a good quality effluent. Such a program will pay dividends.

To assure efficient operation of the softener, the following items should be checked:

(1) Quality of the influent water.

(2) The backwash rate and quantity of backwash water used.

(3) Quantity of salt used per regeneration.

(4) Quantity of water softened between regenerations.

(5) Quantity and flow rate of water used for rinsing.

(6) Periodic examination of the softener and exchange material.

The correction of the problem may involve better clarification of the influent water. In some cases, revision of the backwash, regeneration or rinsing cycle or improvement of the distribution system may be necessary. Perhaps a periodic chemical cleaning with special cleaning agents may be all that is necessary.

However, if permanent damage has been done to the resin, then replacement of the material will be necessary. When replacements are necessary, the selection of one of the high capacity resins to replace greensand or the silicious type zeolite can often lead to substantial savings in salt requirements. Table I shows the comparison between capacity and salt requirements for various types of exchange materials. It should be noted that greater exchange capacities can be secured with the polystyrene resins at a lower salt consumption than with the greensands. It should further be noted that the polystyrene resins can tolerate a wider variation in pH and temperature. In many cases, the softening rates are higher with these materials and increased capacity can be an added benefit. The replacement of natural greensand with a polystyrene resin has resulted in as much as a 40% increase in softening rate and as high as a tenfold increase in softener capacity. The savings in both salt and labor attributed to operation of the softener can result in sufficient savings to pay for the replacement in less than two years.

A BETZ Field Engineer will be pleased to discuss your zeolite softener problems, review operating conditions and offer recommendations for the proper mechanical or chemical correction to assure maximum efficiency. Should replacement of the bed be necessary, he will be pleased to recommend the proper BETZ Resin for your requirements.

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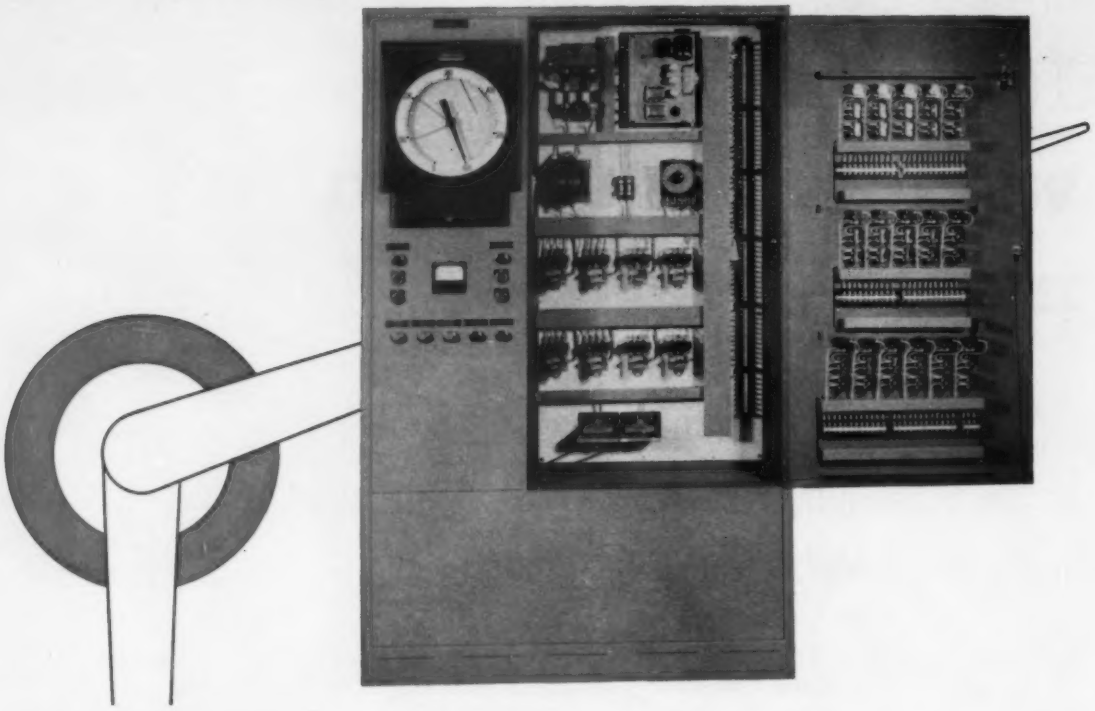

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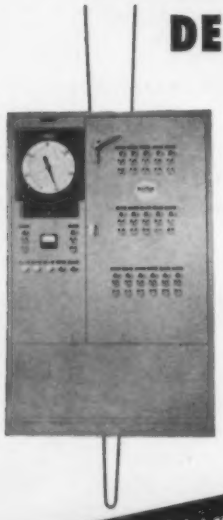

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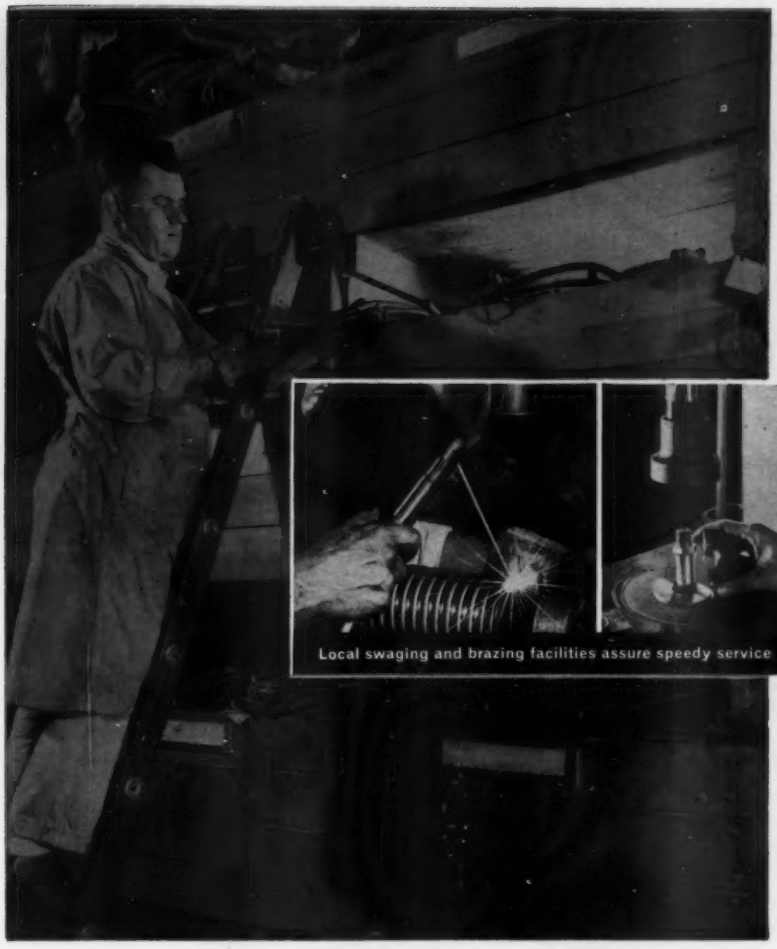

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Flint, Michigan
Grandsen-Hall & Co.
Garfield, New Jersey
Power Packing Co.
Grand Rapids, Mich.
Industrial Service
Great Bend, Kansas
Scheufler Supply Co.
Green Bay, Wisconsin
Van's Supply & Equipment
Greensboro, N. C.
Southern Rubber Co.
Hammond, Indiana
Motor & Axle Parts
Hartford, Connecticut
Faxon Engineering Co.
Hope Rubber Co.
Holyoke, Connecticut
Hope Rubber Co., Inc.
Houston, Texas
Metal Hose & Specialties
Indianapolis, Indiana
Central Rubber & Supply
Jacksonville, Florida
Holley-Edwards Sales
Parker, Helmes & Langston
Jackson, Mississippi
Dilworth of Mississippi
Kalamazoo, Mich.
Robert M. Sortie Co.
Kansas City, Missouri
Mid-States Supply Co.
Long Beach, California
Barnes & Delaney
Longview, Texas
Peerless Supply Co.
Los Angeles, California
F. D. Delafield Co.
L. A. Flexible Metal Hose
Louisville, Kentucky
Neill Laviolle Supply
McKees Rock, Pa.
Speck Marshall Co.
Memphis, Tennessee
J. E. Dilworth Co.
Miami, Florida
Harry P. Lou, Inc.
Milwaukee, Wisconsin
Acme-Machelf Co., Inc.
Minneapolis, Minn.
W. S. Nott Co.
Mobile, Alabama
Pond-Johnson, Inc.
Southern Gasket & Rubber
Muscle Shoals, Ala.
Owen-Richards Co.
Muskegon, Michigan
Muskegon Hdwe. & Supply
New Orleans, Georgia
Gulf Belting & Gasket
Oklahoma City, Okla.
Midsite Supply Co.
Omaha, Nebraska
Midco Supply Co.
Orlando, Florida
Harry P. Lou, Inc.
Paducah, Kentucky
Henry A. Petter Supply
Pampa, Texas
Radcliff Supply Co.
Philadelphia, Pa.
Airline Equipment Co.
Briggs Rubber Products
John Bridge Sons Co.
Phoenix, Arizona
Regan Manufacturing
Pittsburgh, Pa.
Goodall Rubber Co.
Gooding Rubber Co.
Lambert Jones Rubber
Portland, Oregon
Alaskan Copper & Brass
Providence, R. I.
Rhode Island Products
Richmond, Virginia
Richmond Rubber Co.
Rochester, New York
Chamberlin Rubber Co.
Sacramento, California
Sacramento Rubber Co.
Saginaw, Michigan
Beckley Equipment Co.
Grandsen-Hall & Co.
Reichle Supply Co.
Salt Lake City, Utah
Capitol City Steel Co.
San Francisco, Calif.
Industrial Hose Supply
Seattle, Washington
Alaskan Copper & Brass
Pacific Fishing & Trading
Shreveport, Louisiana
Peerless Supply Co.
South Bend, Indiana
Power Transmission Co.
St. Louis, Missouri
Flexible Metal Hose Co.
Syracuse, New York
Burns Piping Supply
Terre Haute, Indiana
Midwest Gear & Supply
Toledo, Ohio
Bigelow Gibson Co.
Trenton, New Jersey
Wiley-Hughes Supply Co.
Tulsa, Oklahoma
Frank Wheatley Co.
Warren, Michigan
Charles Strelinger Co.
Watertown, Mass.
Hope Rubber Co.
Williamsport, Pa.
E. Kesler Co.
Wilmington, Delaware
Briggs Rubber Products
Worcester, Mass.
Brierly, Lombard Co.

*DUPONT TRADE MARK

IH-305

TOMORROW'S ENGINEERING TODAY

Flexonics

INDUSTRIAL HOSE

FLEXONICS CORPORATION • 1340 SOUTH THIRD AVENUE • MAYWOOD, ILLINOIS

Divisions
INDUSTRIAL HOSE • EXPANSION JOINT • BELLOWS • AERONAUTICAL • AUTOMOTIVE
Flexonics Research Laboratories, Elgin, Illinois
In Canada: Flexonics Corporation of Canada, Limited, Brampton, Ontario

For more facts circle 509 on Reply Card

How to change your plants in the middle of a run

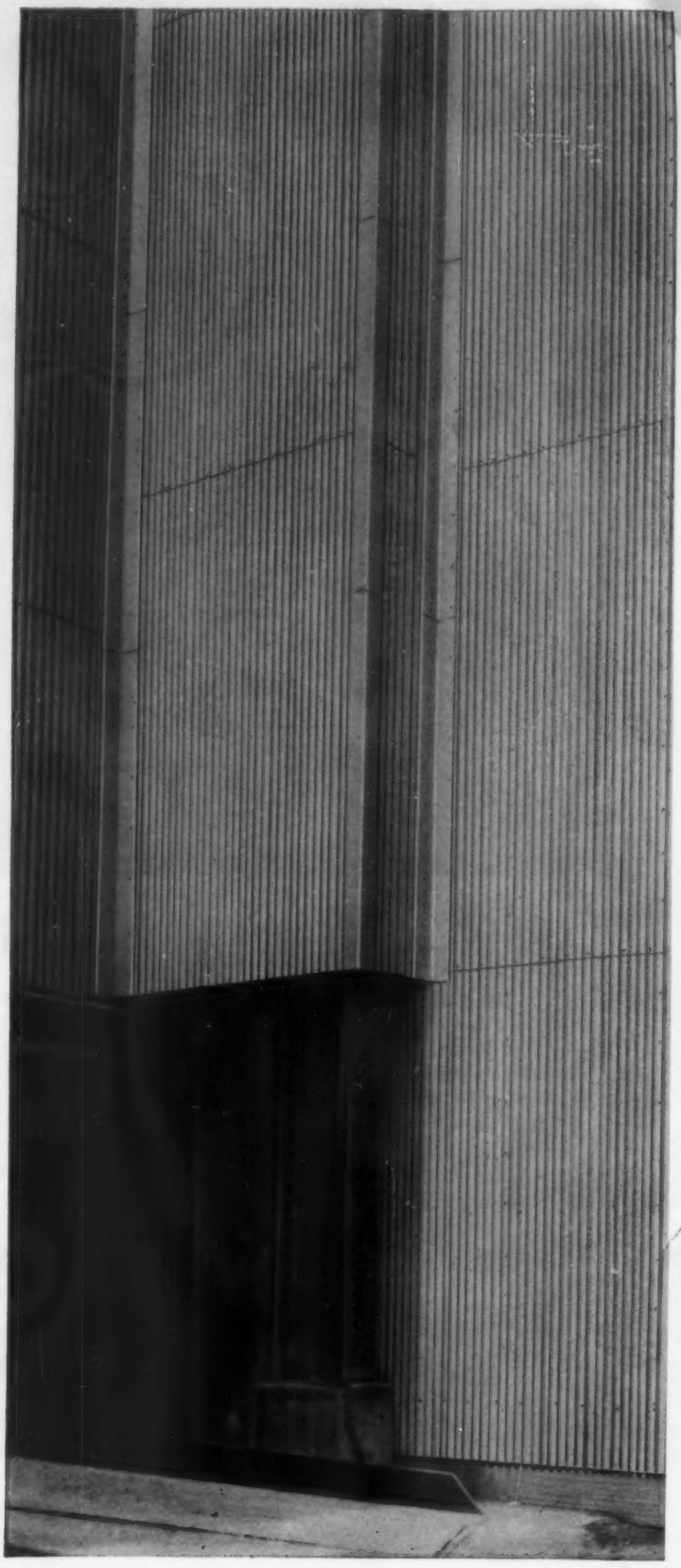
Owens-Corning Fiberglas Corporation had to replace their old plant in Newark, Ohio, but they didn't want to shut down to build a new one. So they built a new shell *around* the old plant. Production never stopped, and when the new building was completed they dismantled the old one and carried it out the door.

The builder applied the new roof and side walls of USS Galvanized Steel Sheets using Fiberglas-reinforced plastic panels for lighting. Both these materials are light and easy to handle, so construction time and labor were reduced. Because USS Galvanized Steel Roofing and Siding Sheets are exceptionally strong and corrosion resistant, there's practically no danger of wind or weather damage to the new building.

Inside the plant are some of the largest furnaces in the world for melting glass. They operate at temperatures over 2,000°F. Here was another reason for the selection of Galvanized Steel Roofing and Siding—it is more fire resistant than other types of roofing and siding and it retains its strength at temperatures that ignite, soften or distort other materials.

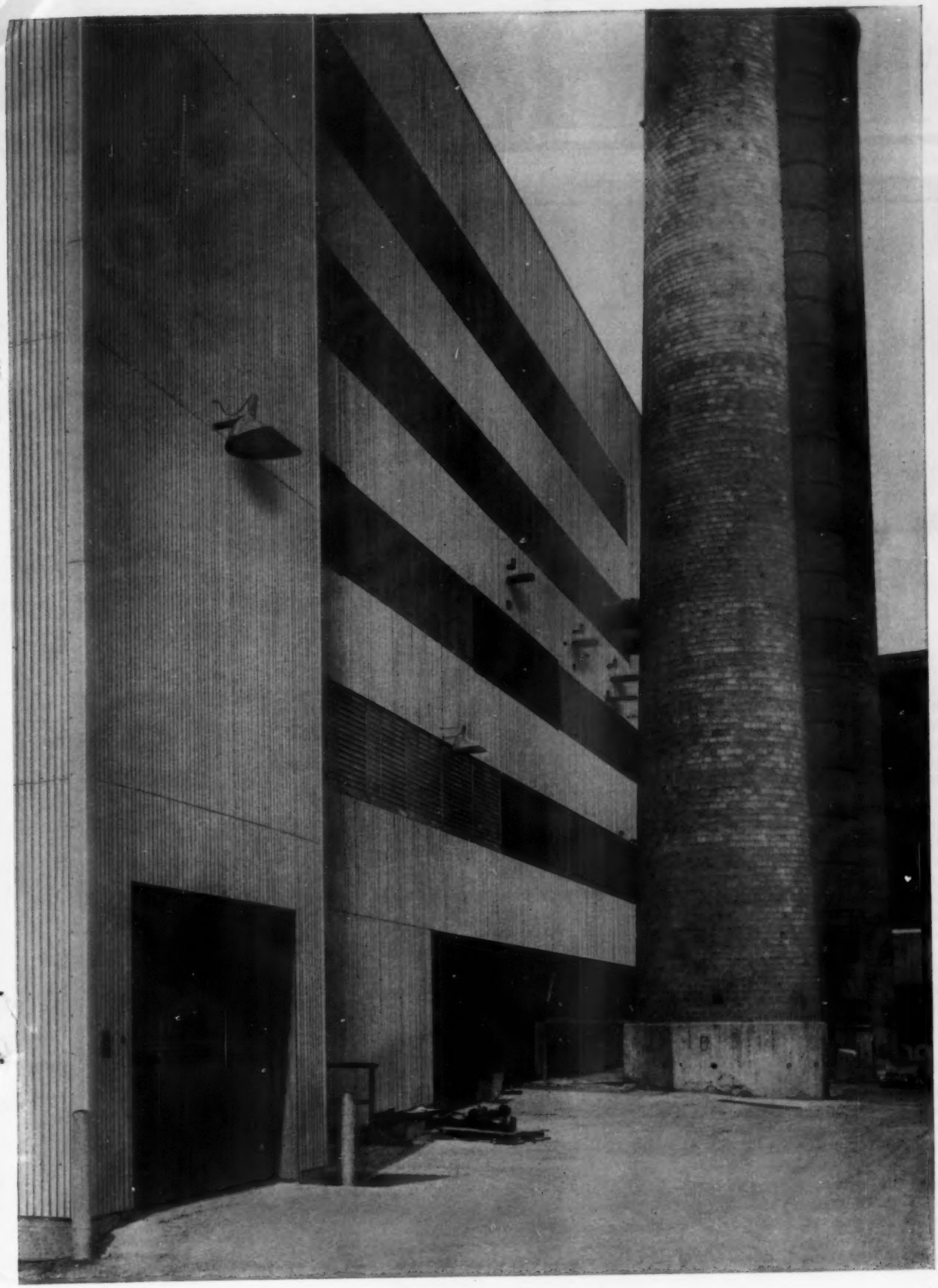
Specify USS Galvanized Steel Roofing and Siding for your next re-roofing program or plant maintenance project.

USS is a registered trademark
Fiberglas is the registered trademark of Owens-Corning.

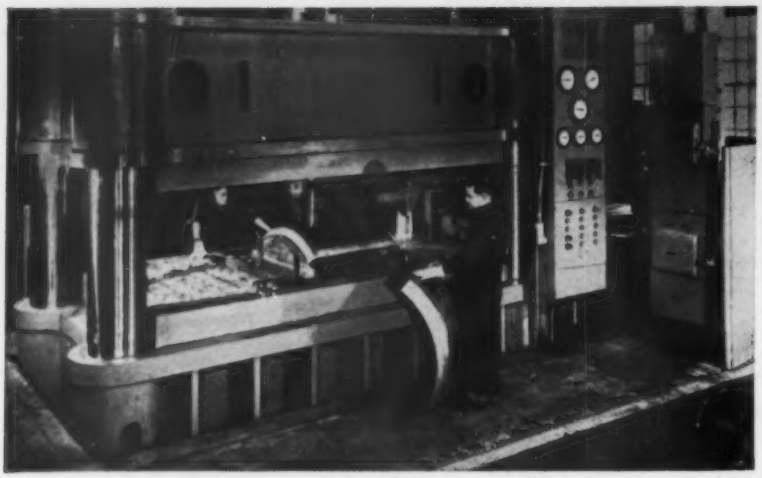


United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
American Steel & Wire—Cleveland
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel



Lubrication



PREMIUM HYDRAULIC OILS CAN MORE THAN PAY BACK THEIR INITIAL EXTRA COST

Laboratory experiments, exhaustive field tests and, finally, general industrial experience have conclusively proved the long-term economy of a premium hydraulic oil over even the best straight mineral oil.

What makes a premium oil different? Straight mineral oil is a highly refined product containing many good lubricating qualities. However, it may be subject to fairly rapid oxidation, and it foams persistently when agitated.

On the other hand, a premium hydraulic oil, like Texaco Regal Oil R&O, contains a number of additives specifically designed to minimize or eliminate the undesirable qualities of straight mineral oil, while retaining the good.

Importance of these qualities in a hydraulic system. Oxidation, rust and foam all breed trouble in hydraulic sytems, even though they may not be immediately apparent. Because Regal Oil R&O is specifically inhibited to guard against these dangers, you can expect four distinct areas of savings, in spite of higher initial cost, when you install this premium oil in your hydraulic equipment:

It saves man-hours. Because a premimum hydraulic oil is inhibited against oxidation and rust, it will not form sludge in the system or allow parts to corrode. This can more than double the intervals between scheduled overhauls, saving valuable maintenance man-hours.

It prevents production losses. By keeping hydraulic systems clean, Regal Oil R&O guards against those sudden, unexpected stoppages that halt production, are costly to overcome. Pumps and other parts last much longer, too.

It cuts rejects when used in production equipment. Regal Oil R&O is inhibited against foaming. And foam, which causes jerky operation, can be a large factor in ruined machine parts.

It reduces oil drains. Because Regal Oil R&O lasts longer than straight mineral oil, systems don't have to be refilled nearly so often. The savings on this one factor alone are often enough to counterbalance the higher initial cost of Regal Oil R&O.

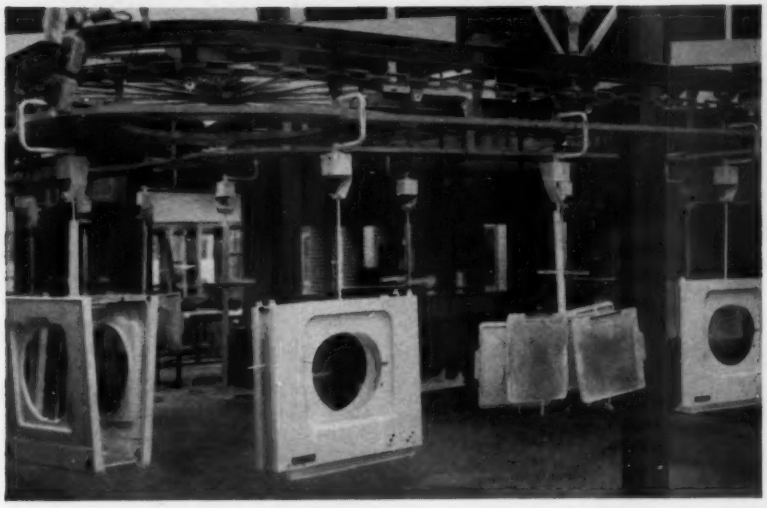
Way found to coat steel concrete forms without wasting oil

How to coat steel concrete forms without wasting a large amount of the oil in run-off has always been a problem for manufacturers of concrete products.

One of the country's leading concrete pipe producers has now licked this problem by using a 50-50 mixture of diesel fuel and Texaco Stazon. Originally developed as a non drip product for textile mills, this unique Texaco lubricant clings just as well to steel forms. The pipe manufacturer reports that run-off has now been eliminated completely. The new mixture can be used in temperatures as low as 0°F and can be either sprayed or painted on the forms.

MOVIE OF THE MONTH
SEE...
"Shear Magic"
Texaco's new full-color film on the nature and uses of grease is a must-see feature for anyone interested in getting the most out of grease-lubricated equipment.

news



How manufacturer eliminated rejects caused by flaking conveyor

Flakes of rust dropping from the plant-wide conveyor system onto newly painted finishes were causing an unhealthy 10% reject rate for one manufacturer of large household appliances. His problem: the conveyor traveled through areas where the humidity was high, as well as through baking ovens. These widely varying heat and moisture conditions were too much for the conveyor finish.

Texaco called in. Although the problem was not directly associated with lubrication, the visiting Texaco Lubrication Engineer heard about it and recommended having the conveyor sprayed with Texaco Rustproof Compound L. This versatile Texaco product withstood both the excessive humidity and the high temperatures that the conveyor encountered in its travels around the plant. Rusting ceased and rejects of the finished product dropped drastically from 10% to a normal 1½%.

New Seagram building gets cutting oil bath

In one of the most unusual uses for a petroleum product yet, the Seagram building, on New York's Park Avenue, recently employed Texaco Sultex Cutting Oil as a bath for its unique bronze facade. The reason: a dark "antique" surface on the metal was wanted, and the sulphur in Sultex reacted nicely with the bronze to give the desired effect of age!

For more facts circle 511 on Reply Card

NEW PRODUCT NEWS

New tool joint compound resists pressure used in joining pipes, and joints can be broken without using much more torque than was applied in making them up. Primarily for use in oil fields. Makes an excellent thread lubricant anywhere where cost is a big consideration.

Lube facts to be aired for metal-working plants

The story of many of the less common, "odds and ends" lubricants used in metalworking will be told in the July issue of "Lubrication" magazine. The editors plan to discuss roll oils (both ferrous and non-ferrous), lubricants for hot punching, deep press drawing, wire drawing and the like. To be sure you're on the list to get this important issue, mail coupon.

Clip Coupon To Company Letterhead

TEXACO INC., Dept. E-LN-20
135 East 42nd Street
New York 17, N. Y.

Dear Sirs:

☐ I am interested in seeing "Sheer Magic".

I would like a free copy of

☐ Lubrication Magazine

☐ Management Practices that Control Costs via Organized Lubrication.

Name _____ Title _____

Firm _____

Address _____

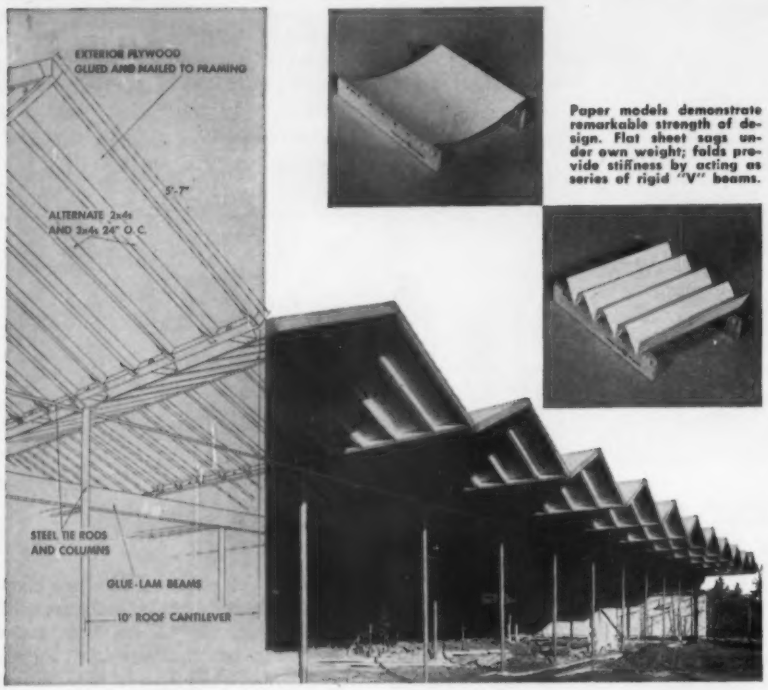
City _____ State _____

A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:

- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
- ☐ PURCHASING
- ☐ MAINTENANCE
- ☐ CONSTRUCTION
- ☐ _____


EXTERIOR PLYWOOD GLUED AND NAILED TO FRAMING
5'-7"
ALTERNATE 2x4s AND 2x6s 24" O.C.
STEEL TIE RODS AND COLUMNS
GLUE-LAM BEAMS
10' ROOF CANTILEVER

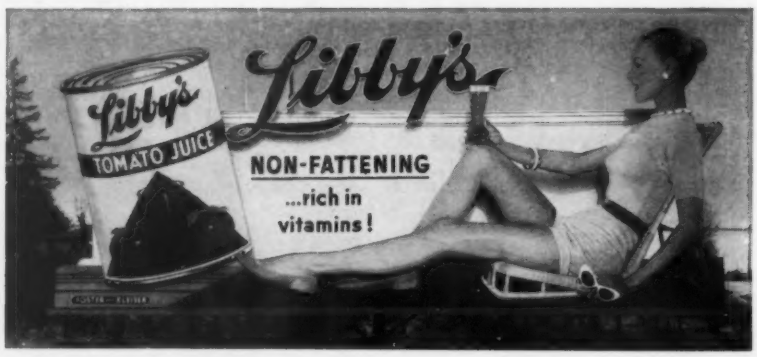
Paper models demonstrate remarkable strength of design. Flat sheet sags under own weight; folds provide stiffness by acting as series of rigid "V" beams.

Strength from shape—not mass—is the key to this precisely engineered fir plywood folded plate roof. The plywood plates are stiffened with light lumber framing and act in pairs to form a series of giant "V" beams.

Stronger, yet less expensive (by 20 per cent or more) than conventional joist or truss construction, fir plywood folded plate roofs are ideal for warehouses, stores or other buildings that require large, clear floor areas. Depending on design, the system permits clear spans of 50 feet or more.

In the 14,000 sq. ft. shopping center shown here under construction, plywood roof components were fabricated on the ground using common labor, and installed by a 6-man crew in less than nine hours. In-place cost came to less than 80c per square foot.

Delicate electronic equipment, produced by Edgerton, Germeshausen & Grier, Inc., Boston, is shipped to AEC test sites in Eniwetok in light yet rugged fir plywood containers that provide maximum protection at low cost.



Giant overlaid plywood cut-outs add real impact to outdoor advertising. This giant bulletin produced by Foster & Kleiser, San Francisco, for Libby's is being rotated in key West Coast markets. The plywood cut-outs are light, strong, and easy to fabricate. The medium density resin-fiber overlay is fused to the panel during manufacture to form a smooth, durable surface for quality paint finishes. The overlay is completely waterproof and has a slight "tooth" for better paint adhesion.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

TACOMA 2, WASHINGTON

—an industry-wide organization devoted to research, promotion and quality control

DFPA TESTED QUALITY

Always specify by DFPA grade-trademarks

For more facts circle 512 on Reply Card

For maximum diffused, low-cost daylighting use Johns-Manville Fiber Glass *Corrulux*®

the translucent building panels that defy breakage

Shatterproof Johns-Manville Corrulux translucent building panels are the modern answer for new construction or modernization of industrial and commercial buildings. These versatile and colorful fiber glass-reinforced building panels offer many advantages when used for skylighting, sidelighting, glazing, partitions, awnings, decorative panels . . . and many more applications.

Translucent—Corrulux diffuses daylight, cuts glare, admits more usable light. Provides evenly lighted shadowless areas.

Shatterproof—Corrulux does away with the expense and hazard of window breakage, withstands vibration, vandalism, hailstones, accident impacts.

Economical—Because of its efficiency Corrulux can pay for itself in savings in artificial lighting and lower cost indoor daylighting. Corrulux makes possible low-cost modernization of old buildings. Corrulux resists the effects of most industrial fumes. Maintenance costs are reduced to a minimum.

Colorful—Corrulux is decorative, adds bright color accents. Built-in colors are an integral part of the panel.

Structural Strength—Corrulux is amazingly strong, yet light in weight.

For complete specifications and samples, see your J-M distributor or write: Johns-Manville, Box 158, New York 16, N. Y. In Canada, Plastic and Allied Building Products, Ltd., Box 250, Dundas, Ont.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

For more facts circle 513 on Reply Card

"Here at BERKSHIRE we're hosiery men

LESTER MARBURGER
Superintendent of Plant Maintenance

"We specialize in the manufacture of women's stockings and lingerie," says LESTER MARBURGER. "That's why world-wide Berkshire is the largest selling brand of women's hosiery.

"We've always liked the OTIS specialist's approach to Elevator Maintenance. It means excellent service. In the hosiery industry, the name BERKSHIRE is synonomous with service. And service, even more than charity, begins at home. That's why we've been doing business with the OTIS Elevator Company since 1906, when we erected our first building.

"The OTIS specialist's approach has served us consistently and well. Our only 'down' time, if you'll pardon a pun, is the time necessary to reach the 1st floor from the 5th.

"At present, we have 12 OTIS Freight and Passenger Elevators under OTIS MAINTENANCE. We have complete confidence in their continued performance."

What is the OTIS *specialist's approach* to elevator maintenance?
It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long OTIS training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U.S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

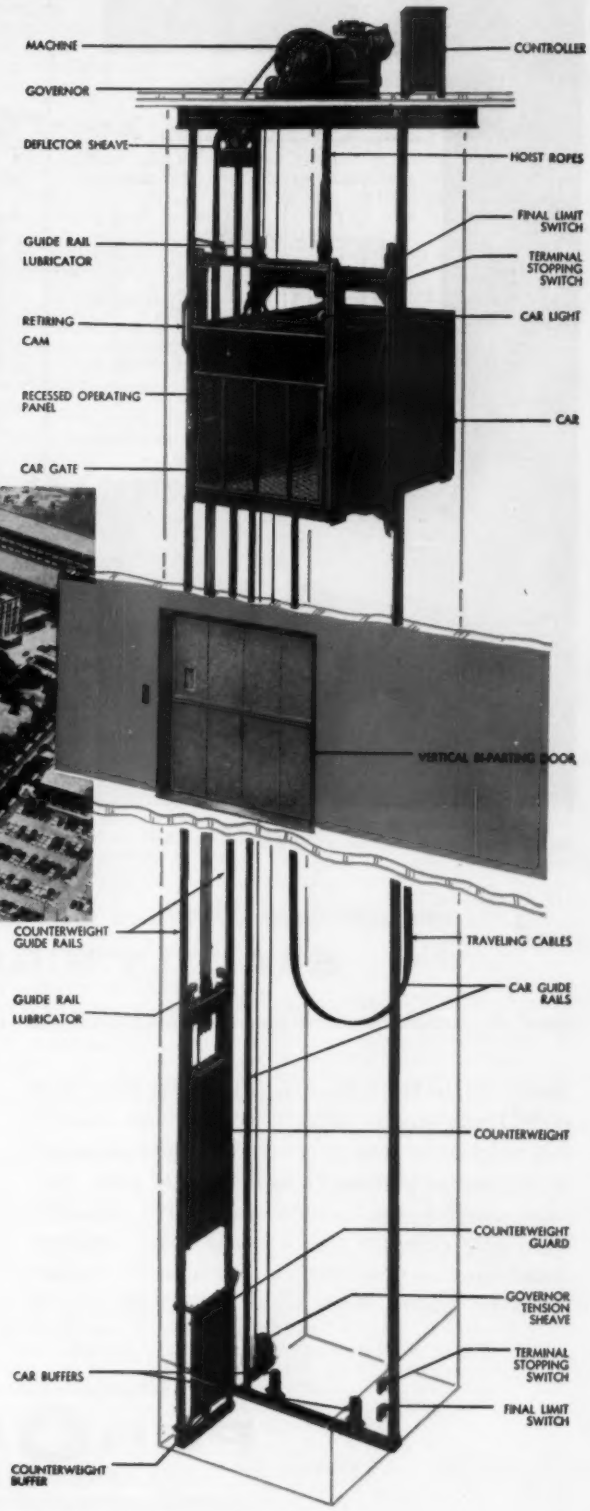
elevator maintenance

THAT KEEPS ELEVATORS RUNNING LIKE NEW

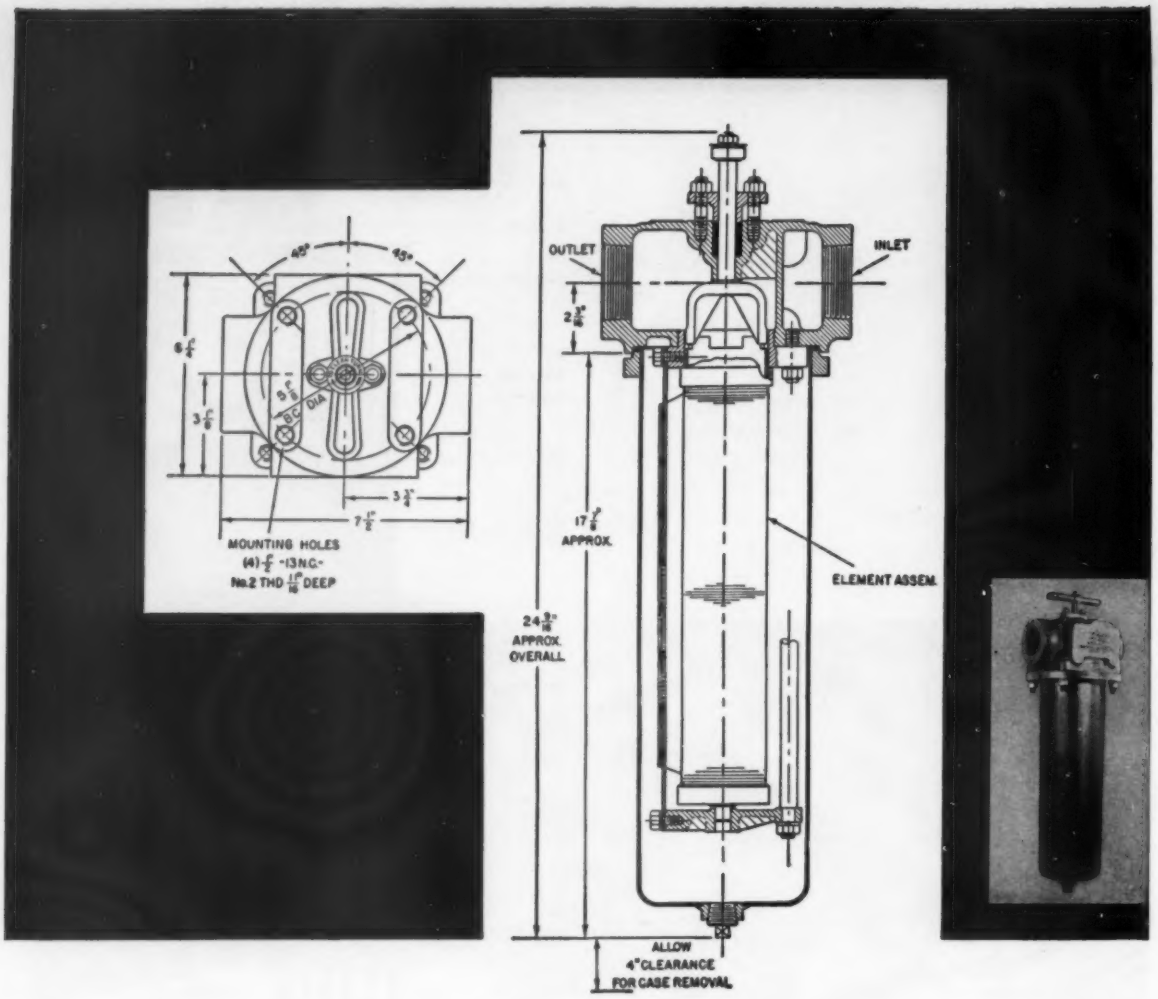
OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

. . . not elevator maintenance men"

BERKSHIRE KNITTING MILLS
Reading, Penna.



For more facts circle 514 on Reply Card



This one standard Purolator filter is

EXACTLY RIGHT *for all these fluids:*

inks • paints • varnishes • food products • greases • process fluids • fuel and lube oils

SPECIFICATIONS: This is Purolator filter model G-141J with simplex full flow metal element strainers. It is designed for primary or first stage filtration and can be installed on pressure or suction side of pump. Recommended for capacities of 6 to 233 GPM, dependent on spacing (from .001 to .020 and fluid viscosities). Relief valves set from 10-12 to 50 PSI are incorporated in several models. Motor driven knife blade to clean element can be furnished whenever conditions make manual rotation impractical. Head made of high tensile cast iron, body of drawn steel. Inlet and outlet connections are 2", drain plugs are provided. Maximum pressure: 125 PSI; weight: 37 lbs.

Remember, if these specifications don't match your needs, there's probably a filter that does at Purolator. Find out. Send in your problem.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

For more facts circle 515 on Reply Card

BULLETINS just released and of immediate plant interest

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 263-264.

PUMPS, COMPRESSORS

101 Industrial Pumps—Centrifugal and rotary pumps for many industrial uses are illustrated and described in this 72-pp catalog. Featured are open-impeller centrifugal pumps, in both sealed and seal-less types, and mechanical positive-displacement rotary pumps, as well as pumps designed for special conditions of temperature, viscosity, specific gravity, lubricating characteristics, chemical properties, and abrasives. Detroit Harvester Co.

102 Close-Coupled Pumps—Catalog D-101 describes small centrifugal pumps for air conditioning systems, lawn sprinkling systems, small cooling tower systems etc. Contains outline dimensions, design and material data and performance curves for these pumps. C. H. Wheeler Mfg. Co.

103 Diffusion Pump—Featured in this product bulletin is a diffusion pump which obtains pressures of 10-6 mm of mercury after a few minutes of pumping in systems up to five liters of total volume. Gives details and illustrates a three-stage pump and gages for measuring low pressure. Delmar Scientific Laboratories.

104 Proportioning Pump—Bulletin Ref. No. 1106.20A-1 describes a proportioning pump for general industrial fluid use. Design features are illustrated and described, and capacities given. B-I-F Industries, Inc.

105 Heavy Duty Compressor—Eight-pp Bulletin 350 describes and illustrates a horizontal, water-cooled, single-stage, heavy duty compressor designed to fit most compressed air applications. Photos, line drawings and cross-sectional views illustrate construction details. Pennsylvania Pump & Compressor Co.

MECHANICAL POWER TRANSMISSION

106 Gear Drives—High speed gear drives for special test stands, industrial applications, pipeline air conditioning service are illustrated and described in 20-pp Bulletin 5904. Contains engineering details, dimensions, rating tables and other selection data. Western Gear Corp.

107 Screw Conveyor Drive—Featured in 16-pp Bulletin A667C is a screw conveyor drive complete with speed reducer, packing gland and drive shaft, all of which mount as a unit on a trough end. Includes photos, engineering drawings with dimensions, prices, and tables to facilitate selection of units and V-belt drives as required. Dodge Mfg. Corp.

108 Thrifty Speed Reducers—Bulletin 5908, about 20 pp, contains engineering information and specifications on SpeedMaster vertical-helical speed reducers offering economy of original and operating costs. Covers both double and triple reduction units and includes selection instructions covering many types of installations. Western Gear Corp.

109 Clutch-Pulley Package—Ten-pp Electro-Sheave Brochure WEB P-52 describes in detail a clutch-pulley package for direct installation on standard electric motors from 1 to 25 hp. Large cutaway illustrates design features. Included are sections on description, operation, dimensions. Warner Electric Brake & Clutch Co.

110 Flexible Shafts—Bulletin 590 contains design data on a line of high speed flexible shafts designed to transmit rotary motion over a curved path. Dimensions and specifications are included. Stow Mfg. Co.

111 High-Torque Transmissions—This 32-pp engineering data booklet describes transmissions and reduction gears with input torque capacities ranging from 120 to 2400 ft-lb. Includes detailed engineering drawings, specifications, including capacity, gear ratios, and variations available for all standard units. Cotta Transmission Co.

112 V-Belts and Fasteners—Bulletin V-227 contains 6 pp of detailed information on V-belts and V-belt fasteners. Describes use of fasteners with open-end V-belting, how to determine belt lengths, and includes V-belt replacement charts, and other data. Flexible Steel Lacing Co.

113 For Conveying, Transmission—Featured in this 8-pp bulletin is a complete selection of rubber, Neoprene and Hycar belting for conveying and power transmission. Specification data table is included. Voss Belting & Specialty Co.

114 Economical Bearings—Featured in this product bulletin are Iron Oilite bearings suitable for many "bronze" applications where corrosion is not a problem and mechanical strength is within tolerable limits. Complete performance data, properties, recommended uses and other information is provided. Chrysler Corp.

LUBRICATION

115 Automatic Lubrication—Advantages and economies of automatic lubrication systems are detailed in 16-pp Form 1-4428. Typical installations are illustrated and described, as well as various types of lubrication units, and a section on operating characteristics and advantages is included. Lincoln Engineering Co.

116 Lubrication System—Eight-pp Bulletin 1451 describes lubrication and coolant systems for the steel, nonferrous metal and paper industries. Featuring illustrations of recent installations, booklet includes specification tables. Dravo Corp.

VALVES, TRAPS, PIPING AND FITTINGS

118 Control Valves—Bulletin 300 describes a three- and four-way control valve for a variety of rugged control applications. Wash drawings of cut-away views and diagrams explain operating principle and design features and table gives specification data. W. H. Nicholson and Co.

119 Molded PVC Valves—Six-pp Circular 601 describes Luncor, all-molded PVC valves. Features table showing recommendations for handling various corrosive fluids, plus information on sizes, weights and dimensions of both screwed and socket end valves, as well as installation data. Lunkenheimer Co.

120 Corrosion-Resistant Valves—Featured in 24-pp Catalog 425 are stock, wedge gate, check, throttle and digester cap valves made of corrosion-resistant materials. Includes tables giving critical dimensions and material specifications. W. G. Rovang and Associates, Inc.

121 Cast Steel Valves—Catalog KSL-M contains 22 pp of detailed information on cast steel gate, globe, angle, and swing check valves for a variety of industrial and other uses. Dimensional data and specifications are included. Kerotest Mfg. Co.

122 Hydraulic Operating Valves—Featured in 20-pp Reference Book 39-6 are hydraulic operating valves offering economy of operation and other advantages. Dimensional data and diagrams, capacity charts, piston speed and flow charts are included. Homestead Valve Mfg. Co.

123 Valve Chart—This automatic valve wall chart features ready reference data on company's varied line of hydronic controls, relief valves, pressure regulators and safety devices. Chart is produced the same size as a standard file folder, opens to 12 by 18 in. A. W. Cash Valve Mfg. Corp.

124 Safety Relief Valves—Comprehensive Catalog 88, 84 pp, gives detailed information on safety relief valves for power, processing and general industrial services. Extensive engineering charts and data, together with valve discharge capacity tables for liquids, air and gas, and steam are included. Valves from ½- to 6-in. sizes, of bronze, semi-steel or steel, are shown. Valves are for maximum service ranges from 20 to 3000 psig and 300 to 750 F. Marine & Industrial Products Co.

125 Solenoid Valves—Listed in 36-pp Catalog 444 is a line of solenoid valves of bronze and stainless steel

BULLETINS

(Begins on page 21)

construction. Detailed valve specifications, performance data, specific application information and other features are included in the catalog, as well as cutaway views and diagrams. Atkomatic Valve Co., Inc.

126 Steam Traps—Bulletin T-300 discusses typical applications, capacities and construction of company's steam traps for use in paper mills, chemical plants, textile mills, power stations, and all processes using steam. Includes tables of capacities, orifice sizes, parts and seat pressures and diagrams showing construction details. Ross Midwest Fulton.

127 Aluminum Process Pipe—Expanded availabilities of extruded aluminum pipe in schedules 5, 10, 40 and 80 sizes are listed in 6-pp Form PT-893. Also covers performance characteristics, conversion factors, head loss curves, mechanical properties, and accessories. Booklet contains chart listing specific corrosion resistance recommendations. Kaiser Aluminum & Chemical Sales, Inc.

128 Welding Fittings—Form 593 is a 20-pp catalog covering company's seamless carbon steel welding fittings. Contains complete tables of specifications, product photos, engineering drawings, ASA tables, and other information. Dresser Mfg. Div., Dresser Industries.

129 Hydraulic Fittings—Form 259, 24 pp, presents a line of J.I.C. tube fittings. Contains flow charts, engineering and maintenance information. Provides full data on O-ring seal tube fittings, flare fittings, pipe fittings, tube benders. Lenz Co.

130 Welding Fittings—Twelve-pp Husky Catalog H-1 covers Husky steel fittings for non-critical plumbing, heating and cooling systems. A complete purchasing guide, booklet lists all sizes and styles from 45 and 90-deg elbows, through straight and reducing tees, and concentric reducers. Also outlines advantages of this connecting system, and gives information on procedures. NIB-CO Inc.

131 Loading Assemblies—Bulletin JF-49 contains detailed selection data on a line of loading valves for use wherever large quantities of fluid are loaded or unloaded. Illustrations and cutaway photo show construction and design details. OPW-Jordan.

TOOLS, WELDING AND HARDSURFACING EQUIPMENT

132 Versatile Lathes—Sixteen-pp Catalog 580 describes Schauer Speed lathes for polishing, lapping, de-burring and other secondary finishing work on metal and plastic parts. Illustrates and gives detailed data on bench and floor type units having fixed or variable speed motors, with collet, chuck and vacuum holding fixtures. Accessory equipment is also described. Schauer Mfg. Corp.

133 Welding Guide—This 32-pp, pocket-size welding guide describes stainless, low-alloy, non-ferrous rods and electrodes for manual, automatic and semi-automatic welding. All products are listed in chart form, along with such information as forms available, description, welding applications, AWS-ASTM designations, popular name type, heat treatment data for maximum properties, preheating data. Arcos Corp.

134 Welding Wires—Submerged arc and inert gas welding wires are featured in Bulletin DH-402-C. Typical applications of various stainless steel, low alloy, and mild carbon steel automatic welding wires are described. Page Steel & Wire Div., American Chain & Cable Co., Inc.

135 Welding Positioners—Illustrated and described in 16 pp Bulletin P-28 is a line of welding positioners ranging from 3000 to 100,000 lb capacity. Features and advantages are detailed, and dimensional diagrams, and load tables included. Harnischfeger Corp.

136 Metal Spraying—Economy and effectiveness of metallizing for machine element work, corrosion/contamination protection, combination or high temperature coatings are discussed in 8 pp Reprint 19. Applications are described. Metalweld, Inc.

137 Brazing Alloy Compound—Engineering Data Sheet 2:2:3 describes Nicrobraz Vapo-Flux — designed to produce good wetting and flow of brazing alloys in marginal or poor dry hydrogen atmospheres. Include data on properties, uses and methods of applying. Stainless Processing Div., Wall Colmonoy Corp.

CONSTRUCTION

139 Watertight Masonry—Six-pp Bulletin O.M.-8A outlines major considerations in designing tight masonry walls. Discussed are mortar ingredients and proportioning, compatability of brick and mortar, control of shrinkage and bleeding, separation cracks, effect of mechanical disturbance, and importance of protection. The Master Builders Co.

140 Brick Floors—Bulletin E-27B contains illustrated information on brick floor installations featuring the preparation of corrosion-resistant and wear-resistant joints to reduce costly floor maintenance. Complete procedures and techniques for installation of new brick floors and repair of existing ones, using special, non-shrink grout. The Master Builders Co.

141 Metal Partitions—Flush and semi-flush type metal movable partitions designed to create efficient private and semi-private enclosures are illustrated and described in this 8 pp bulletin. Detailed illustrations and diagrams are included. GR Products, Inc.

142 Industrial Tile—Outlined in this brochure is a test area program offer on vinyl industrial floor tile. Included are laboratory tests, practical tests, light reflectance charts, recommended uses and installation suggestions. Azrock Products Div., Uvalde Rock Asphalt Co.

143 Acoustical Ceilings—Characteristics and advantages of company's line of acoustical materials are illustrated and described in the 36 pp 1959 Edition of this product catalog. Discusses common acoustical problems and how to select an acoustical material for specific applications. Includes selection chart, sound-absorption coefficients, and specifications. Armstrong Cork Co.

144 Rolling Doors—Bulletin 901 contains 16 pp of illustrated information on rolling doors and partitions for a variety of industrial and commercial applications. Includes detail sketches and complete architectural specifications, as well as charts to simplify selection. The Cookson Co.

On pages 263-264 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

INSULATION

145 Building Insulation—Twenty-pp Booklet FB-105 contains descriptive information on uses of cellular glass insulation on roofs, parking decks, core walls, wall linings, curtain walls, perimeters and ceilings. It contains drawings and specifications for typical applications, as well as technical data and charts. Pittsburgh Corning Corp.

146 Pipe Insulation—Described in the current issue of this company publication is the application of Gilsulate pipe insulation in underground piping system of a large research center. Photos showing construction and installation details are included, as well as date on nature and uses of Gilsulate. Gilsulate Div., American Gilsonite Co.

147 Glass Fiber Insulation—Characteristics and advantages of a blanket type glass fiber insulation are detailed in this product bulletin. Thermal and acoustical performance data is furnished. Mundet Cork Corp.

148 Styrofoam Covering—Twelve-pp Bulletin 157-57 covers Styrofoam pipe and vessel covering applications for low temperature insulation. Generously illustrated, booklet presents a variety of engineering data, recommended application techniques and charts on recommended thicknesses and heat gain. The Dow Chemical Co.

(More Bulletins on page 265)

LONG LIFE WITH NO LUBRICATION...

The Joy T-block design compression rings are an exclusive Joy feature with patents pending.

exclusive T-BLOCK design doubles life of piston rings on JOY oil-free compressors

All Joy oil-free compressors are equipped with carbon-graphite piston rings of T-block design. They require no lubrication and compensate automatically for wear. Blow-by is virtually eliminated for the life of the ring. Brass expanders and stainless steel springs operating in teflon sleeves provide the piston rings with controlled pressure evenly distributed on the cylinder walls. Result: "bug-free" operation and freedom from corrosion. Compressor owners report ring life of 8000 operating hours, and more.

If your operations require oil-free compressed air, whether for instrumentation or for processing, get complete details from Joy. A complete line of oil-free compressors is available from 95 to 3600 cfm, 15 to 600 hp.

Ask for free bulletin 301-15.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY

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Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

WBW I 7519-301

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Do you need pressurized air for jobs like these?

- Oil or Gas Furnace Blowing
- Cupola Blowing
- Gas Line Boosting
- Exhausting from Grinding Wheels

• • then this is what you need!

"BUFFALO" TYPE "E" BLOWERS AND EXHAUSTERS

Wherever you need constant air pressures up to 5500 cfm, these dependable "Buffalo" Blowers will do the job most efficiently and economically. Compact, ruggedly-built, direct-connected "Buffalo" Type "E" Blowers and Exhausters are available in eight sizes. Pressures up to 2 lbs. mean you can choose the units exactly suited to your needs.

Various special features are available, including flanged inlet, flanged outlet, stuffing box around the shaft for gas-tightness. For corrosive fume handling, housings can be coated with Bisonite or Heresite. Housings may also be cast of special metals. Stainless steel, Everdur, brass or aluminum wheels are available. Used in multiple, these units are more flexible and economical than a single large blower.

For full information on "Buffalo" Type "E" Blowers and Exhausters, contact your "Buffalo" engineering representative—or write us for Bulletin FMB-935. Other units suitable for higher pressures are the type RE and type CB blowers.

"Buffalo"

BUFFALO FORGE COMPANY
Buffalo, N. Y.
Buffalo Pumps Division, Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

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FOUR FEATURES FOR OPERATOR SAFETY

1	2	3	4
STORED-ENERGY CLOSING	SPRING-OPERATED OPENING	TIME-DELAY INTERLOCK	DEAD-FRONT CONSTRUCTION

Greater safety with

General Electric *ROLLOUT*

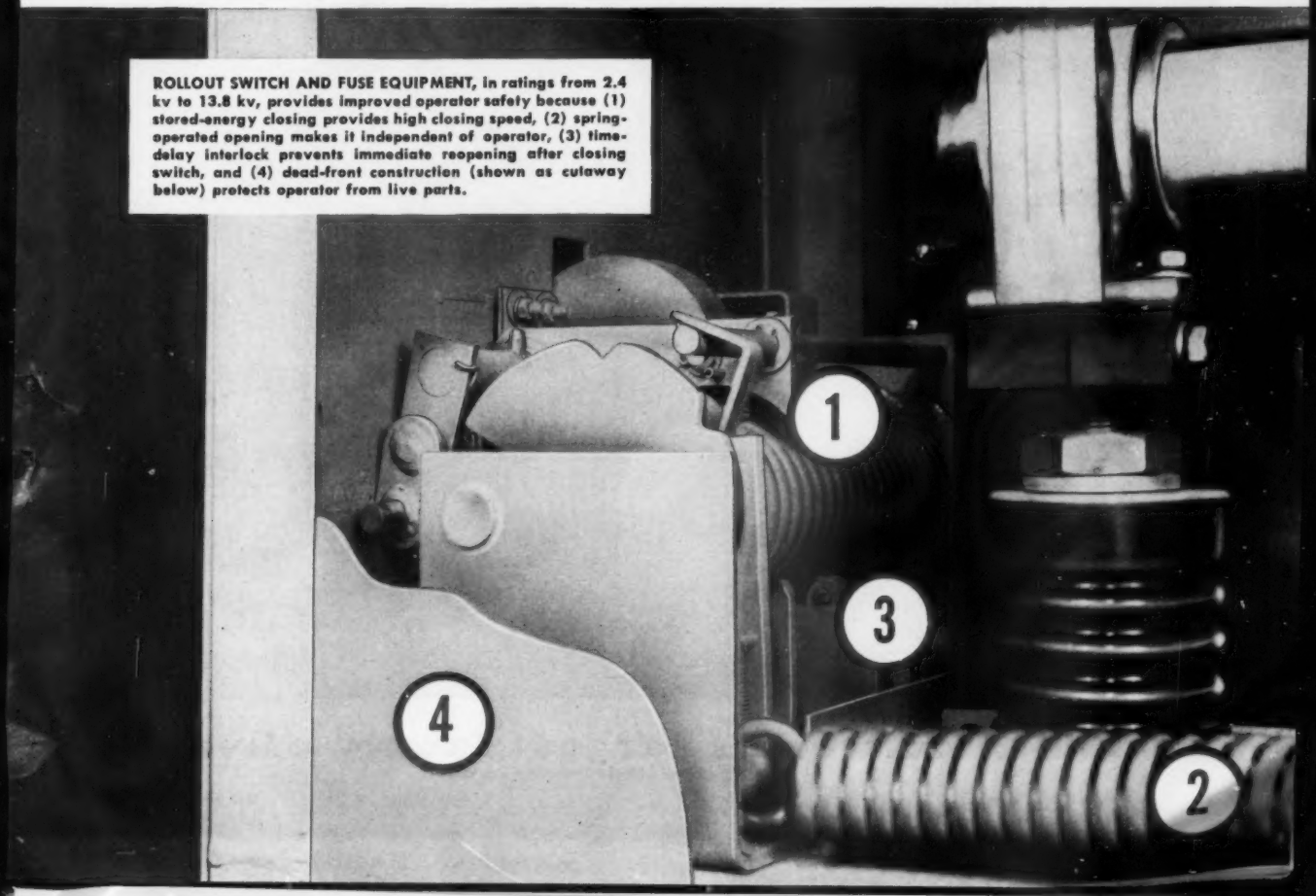
Switch and Fuse Equipment

Optimum safety is built into General Electric Switch and Fuse Equipment with stored-energy closing, spring-operated opening, time-delay interlock, and dead-front construction.

Improved protection, ease of maintenance and inspection, and installation versatility are other benefits you get with this switching and protection equipment. For more information call your nearest General Electric Apparatus Sales Office or write for Bulletin GEA-6623, General Electric Company, Section J514-4, Schenectady, New York.

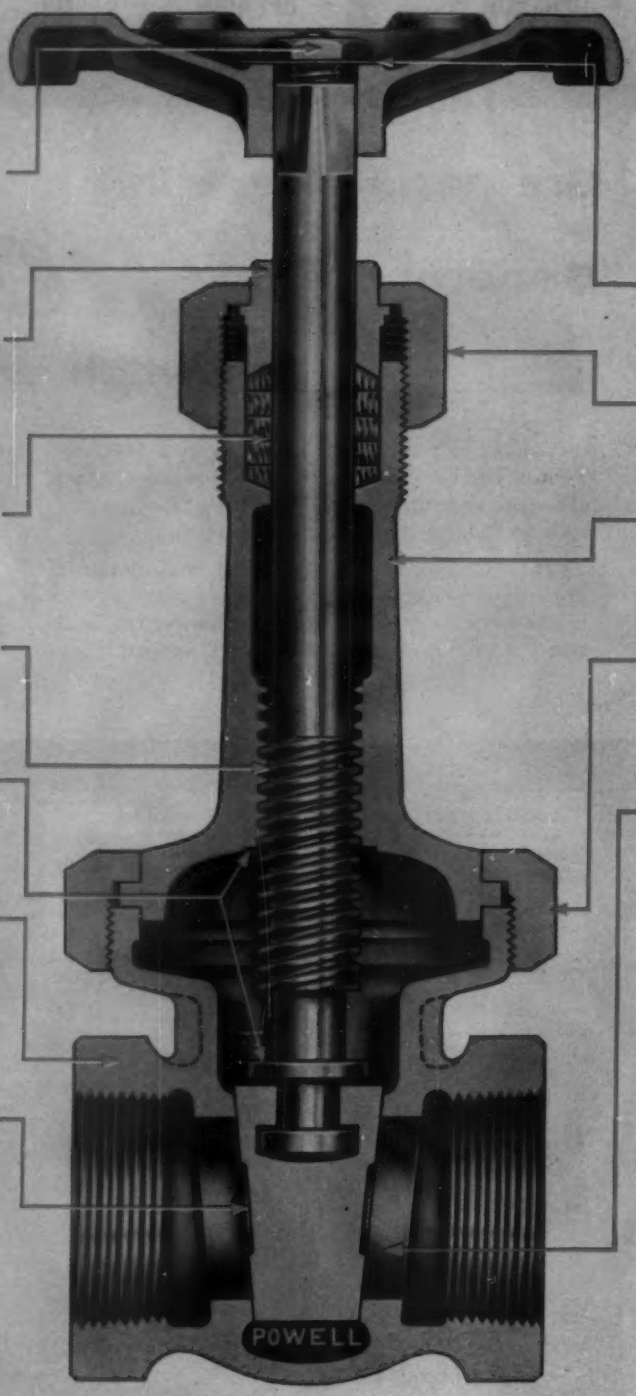
Progress Is Our Most Important Product

GENERAL ELECTRIC



ROLLOUT SWITCH AND FUSE EQUIPMENT, in ratings from 2.4 kv to 13.8 kv, provides improved operator safety because (1) stored-energy closing provides high closing speed, (2) spring-operated opening makes it independent of operator, (3) time-delay interlock prevents immediate reopening after closing switch, and (4) dead-front construction (shown as cutaway below) protects operator from live parts.

ANNOUNCING NEW **POWELL**



Handwheel Nut—securely holds malleable iron, non-heating handwheel to the stem.

Protruding Packing Gland—a Powell feature—compresses the packing, offers additional guidance to the stem, and prevents packing nut from becoming loose and rotating with stem.

Deep Stuffing Box—holds more than ample amount of high-grade steam packing.

Stem—is high tensile bronze, extra heavy, of large diameter, with long Acme threaded section.

Repack-Under-Pressure Seat and Collar—permit valve to be repacked under pressure when fully open.

Body—a high tensile bronze casting, scientifically designed to provide full flow area through the valve.

Wedges—Interchangeable Solid or Double Wedges are available in rising stem valves. They are held to stem by a "T" slot, and are accurately guided to valve seats by means of integral cast lugs that travel in female guideways in the valve body. Entirely clearing the waterway, full unobstructed flow through is assured.

Sectional—Union Bonnet Rising Stem Gate Valve Fig. 2700—125 pounds, Fig. 2714—150 pounds.

POWELL...world's largest family of valves

BRONZE UNION BONNET GATE VALVES

for 125 and 150 pounds WSP

These new BRONZE Union Bonnet Gate Valves have many superior features—some of which are outlined here. For complete details, write for new illustrated circular. Or check with your nearest Powell Valve distributor.

Identification Plate—gives Figure Number and kind of valve.

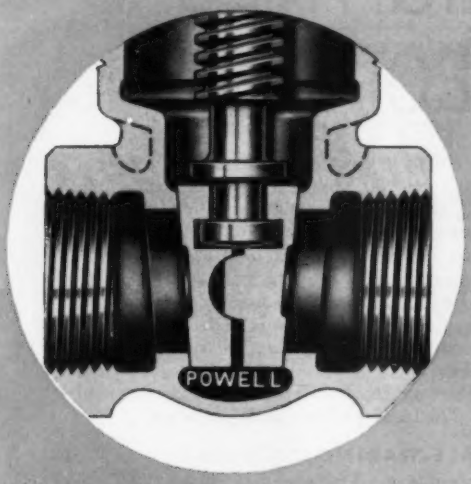
Heavy Hexagonal Packing Nut—for holding gland and adjusting packing.

Long Bonnet—cast of high tensile bronze for long service.

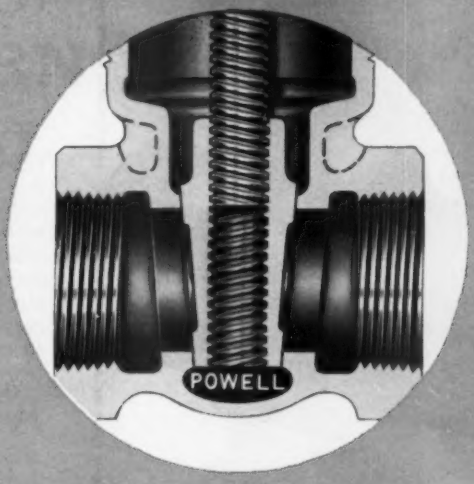
Octagonal Ring Nut—is deep threaded and tightly holds body-bonnet connection. Affords additional wrenching positions.

Ample Space—between seats and end of pipe thread prevents injury to seats when screwing pipe into the body.

Fig. 2707—125-pound Union Bonnet Non-Rising Stem Gate Valve. Also available for 150 pounds—Fig. 2712.



Detail of Sectional View Inside Screw Rising Stem Gate Valve showing Double Wedge Disc and Integral Seats.



Detail of Sectional View Non-Rising Stem Gate Valve showing Solid Wedge Disc that rises on stem. Integral Seats.

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

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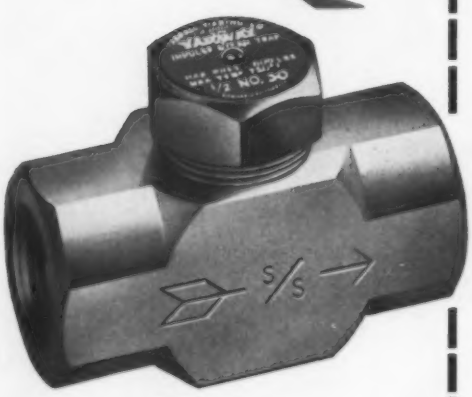
SERIES 60—normal needs, pressures to 400 psi, 6 sizes. **SERIES 120**—normal needs, pressures to 600 psi, 6 sizes. **SERIES 40**—for extra heavy loads, 5 sizes. **NO. 30**—for extra light loads (½" only). **INTEGRAL STRAINER**—highest pressures and marine use, 6 sizes.



NEW NO. 30 IS A LIGHT LOAD SPECIALIST

When the condensate load in your steam lines is *extra light*—this new Yarway ½" No. 30 Steam Trap is *exactly right.*

Specify it. You'll experience new *economy of operation* with the *tighter shut-off.* Operation is *quieter* due to lever action. *Maintenance is less*—because of the replaceable valve-seat assembly, only one moving part and stainless steel construction. Enjoy these special features plus all the regular advantages of famous Yarway Impulse Traps such as *quick heating, even temperatures, small size, good for all pressures, non-freezing.*

Over 1,250,000 Yarway Impulse Traps already sold; buy yours from one of 270 local Industrial Distributors.

YARNALL-WARING COMPANY
145 Mermaid Ave., Philadelphia 18, Pa.

YARWAY *impulse® steam traps*

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new FLAKED Super Filmeen
obsoletes all other filming amines

Totally effective, easiest to handle and use, most economical—this is the verdict of power engineers on the latest development from Dearborn's research laboratories—Super Filmeen in FLAKE form.

This free flowing, finely divided waxy flake is easily handled and weighed; readily dispersible... 31% more active than ordinary octadecylamine acetate... not subject to dehydration at super-heated steam temperatures... will not hydrolyze to acetic acid... remains alkaline in feed solutions.

Shipped as 100% active ingredients—saves on freight.

Update YOUR condensate return line protection with Super Filmeen. Call your Dearborn Engineer or send for detailed Technical Bulletin today!

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pioneer in the science of corrosion control

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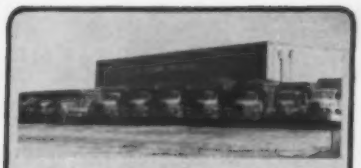

"LUBRIPLATE ENDED OUR TRANSMISSION TROUBLES"

says: DAVID TESONE TRUCKING CO.

"After installing larger engines in some of our trucks, we began to experience transmission failures due to faulty lubrication. We tried several types of gear lubricants without success, until we tried LUBRIPLATE APG #140 Gear Lubricant. Then our gear troubles ended. We are also getting outstanding results from LUBRIPLATE 630-2 in chassis and wheel bearings of our 40 heavy duty trucks!"

David Tesone

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

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BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Power Bill Too High?

PLANT ENGINEERING:

"We find the article 'How To Cut Your Power Bill,' which appeared in PLANT ENGINEERING, issue of March, 1959, to be very interesting. If reprints of this article are available, please send us 20 copies at your earliest convenience." *Henry Moehl, Jr., Maintenance Engineer, Plant Facilities Engineering Section, American-Standard Plumbing and Heating Div., American Radiator & Standard Sanitary Corp., Louisville, Ky.*

▶This article has not been reprinted, but tear sheets may be had upon request. —*Editors.*

Sludgeless Storage For Bunker C Oil

PLANT ENGINEERING:

"I recently came across a very interesting article in the April 1957 issue of your magazine. The article was 'Say Goodbye to Sludge—Rearrange Tank Piping.'

"I would be very pleased to receive four dozen reprints of the above article." *Paul Gladis, Sales Department, Hess Inc., Perth Amboy, N. J.*

▶ We regret that reprints of this article are no longer available, but suggest that Mr. Gladis make his own reprints from a tear sheet we have sent him.—*Editors.*

Building Research Institute

PLANT ENGINEERING:

"Please furnish the address of the Building Research Institute mentioned in your article, pages 132, 133 of the May, 1958 issue of PLANT ENGINEERING." *Charles C. Casto, Capt., USAF, Asst. Chief, Materials Handling Branch, H.Q. Air Materiel Command, Wright-Patterson AFB, Ohio.*

▶ The Building Research Institute is located at 2101 Constitution Avenue, Washington 25, D.C. Inquiries should be addressed to Mrs. Jean Houtchens, Manager of Information Services.—*Editors.*

Metallized Coatings

PLANT ENGINEERING:

"Please send us three reprints of the article 'Metallized Coatings,' starting on page 104 of the March, 1959 issue of PLANT ENGINEERING." *Wheeler Gilmore, Engineer of Production Design, Philadelphia Gas Works, Philadelphia, Pa.*

▶ Tear sheets of this 'round-up' article on the what, where and how of metallized coatings, have been forwarded with the compliments of the editorial department.—*Editors.*

Old Timers

PLANT ENGINEERING:

"We would like additional information on Poly-Cell sprayed on insulation, namely: where sold; cost; preparation of surface; and adhesion limits above 225 F.

"This article appeared in your February, 1955 issue." *Thomas A. Hotz, Civil Engineer, Harding Glass Co., Fort Smith, Ark.*

PLANT ENGINEERING:

"Will you kindly send us the address of the manufacturer of Poly-Cell sprayed foam insulation as described in your February 1955 issue of PLANT ENGINEERING." *L. H. Knox, Maintenance Engineer, Celanese Corporation of America, Rome, Ga.*

PLANT ENGINEERING:

"We are desirous of obtaining additional information—the nearest supplier and how Permagile would be applied to reservoir walls as shown in your December, 1956 issue." *A. Reed, Property & Purchasing Supervisor, Liberty Powder Defense Corp., Newport, Ind.*

▶ The manufacturer of Poly-Cell insulation is Insul-Mastic Corporation of America, 7750 61st Place, Summit, Ill. Further information on Permagile can be obtained from Charles Mathieu, Charles Mathieu & Co., 509 Madison Ave., New York 22, N. Y.

Both these inquiries have been passed along to the companies concerned.—*Editors.*

Pennsylvania Registration Law

PLANT ENGINEERING:

"PLANT ENGINEERING, March, 1959, Court Decisions, page 78, refers to a professional engineering registration law court decision in Pennsylvania.

"The implication in this article is that this decision invalidates the Pennsylvania Registration Law for engineers. If the engineering registration law in Pennsylvania is invalid,

LOOK *for improvements in industrial handcleaners*

A NEW WAY to clean working hands

There has never been such a combination of *plus* features to keep workers' hands healthy—and therefore on the job day after day!

It's a brand new scientific formulation — non-depleting Lan-O-Kleen *PLUS*.

It's WEST'S famous Lan-O-Kleen handcleaner . . . *plus* a softer scrubbing action . . . *plus* a gentler sudsing action . . . *plus* a soothing lanolin action!

All of which combine to combat the depletion of natural skin oils while hands are being washed clean.

Highly important is the exclusive process that keeps the rich lanolin content of Lan-O-Kleen *PLUS* "free" to soothe and soften. Lanolin is impregnated into a corn meal base, instead of being "held" in the soap by conventional methods. In this way, it is instantly released for more positive, beneficial action.

Lan-O-Kleen *PLUS* is dispensed from a patented, precision-action unit. A clog-proof measuring valve with a mechanical agitator delivers a thrifty, yet adequate individual portion. More than 435 pairs of hands can be washed with each dispenser filling.

FREE TRIAL OFFER. We'd be glad to send five pounds of Lan-O-Kleen *PLUS* and loan a dispenser for free trial. Or we'll send a smaller sample for evaluation. Just call your local WEST office. Or mail the coupon to our Long Island City Headquarters, Dept. 13.

☐ Supply a dispenser and 5 lbs. of Lan-O-Kleen *PLUS*.
☐ Send a small sample of Lan-O-Kleen *PLUS*.

Name_____

Position_____

PROGRAMS AND SPECIALTIES
FOR PROTECTIVE SANITATION
AND PREVENTIVE MAINTENANCE

WEST CHEMICAL PRODUCTS INC.

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WEST CHEMICAL PRODUCTS INC.
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Behind this cover are bold new

no other pipe insulation cuts costs so many ways

- No breakage in shipment, handling
- Goes on quicker...cuts, fits easily
- Unharmed by fumes and moisture
- Withstands impact, vibration
- Won't burn, shrink, thermal-shock
- Delivers highest efficiency
- A single layer does the job
- Re-usable...repeatedly

FULL FACTS FREE
Temperatures to 1200°F.; sizes to 44" o.d.; single-layer thicknesses to 5". Ask for Catalog F76-321. It shows why UNIBESTOS saves time and money.

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BACKTALK—FORETHOUGHTS

I feel that plant engineers who are now studying for registration should be advised.

"However, if the article, (or as I understood it) is in error, a correction is in order so that those plant engineers whose duties may require registration, are informed." *William S. Wagner, Consulting Engineer, Philadelphia, Pa.*

► Mr. Wagner is one of several correspondents who asked that the court decision quoted in our March issue be clarified. We forwarded the letters to the compiler of the material, Albert Woodruff Gray, who sent the following reply to the above reader:

"An apology, I think, should be made for my thoughtlessness in not foreseeing the possible construction in the reading of this item.

"In making up this item, I had in mind solely the feature of the statute that served to bring out its outlawry as unconstitutional. That the reference might be read as relating to the current statute that received its immunity bath from any charge of unconstitutionality in the Howarth v. Gilman decision in 1950, did not occur to me."

Organizing Maintenance Shops

PLANT ENGINEERING:

"Would it be possible to send me 30 copies of 'Operating Maintenance Shops' for distribution to students in plant engineering?" *David J. Davison, Instructor, Industrial Engineering Dept., Lafayette College, Easton, Pa.*

► We have had numerous requests for tear sheets of this article which appeared on page 114 of the April, 1959 issue of PLANT ENGINEERING and told how one company organized and operates its maintenance shops. We suggest that readers wanting copies in quantity, have them reproduced locally. We shall be glad to provide a clean copy of the article for this purpose as long as our tear sheet supply lasts.—*Editors.*

Expanding Tool Room Facilities

PLANT ENGINEERING:

"We are planning an expansion of our shops and warehouse facilities. This expansion will include a new tool room complete with new racks, shelves, bins, etc.

"It would be appreciated if you could refer us to published articles or other forms of data covering recommended tool room layout and arrangement and tool storage rack designs." *Keith W. Lawrence, Engineer-in-Charge, Detroit District Boatyard, Corps of Engineers, Detroit, Mich.*

► Tear sheets of articles previously published in PLANT ENGINEERING on tool room organization have been forwarded to this reader along with the names and addresses of several companies who could supply him with additional information.—*Editors.*

Aid With Training Programs

PLANT ENGINEERING:

"Our Swedish company has asked us to provide them with copies of several technical articles on preventive maintenance, and one of the articles that we would like to reproduce is 'Maintenance System for Top Machines,' page 104 through 106, of your March, 1958 issue.

"We will appreciate very much your permitting us to photostat this article, and can assure you that it will be photostated in such a way that the credit line at the bottom of the page will show." *J. R. Hicks, Program Div., Training and Program Liaison, Socony Mobil Oil Co., Inc., New York, N. Y.*

►In addition to the above-mentioned article, which we gladly give our permission to reproduce, we believe Mr. Hicks and other readers will be interested in five PLANT ENGINEERING reprints. These articles provide fundamental training information on rectifiers; electrical measurements (voltage, current, power and power factor) and instrumentation; solenoids; industrial motor control; and fluid power maintenance. Articles may be ordered in quantity at prices which make it possible to distribute a copy to each maintenance man in any plant. A price list may be had on request to the Editor.—*Editors.*

Reclaiming Oil

PLANT ENGINEERING:

"We would very much like to have 10 copies of the article 'Cutting Oil gets "Scrubbing"' which appeared in the April, 1959 issue of PLANT ENGINEERING." *W. A. Alexandroff, Manager, Industrial Div., Pate Oil Co., Milwaukee, Wis.*

► Tear sheets have been sent out to a number of readers requesting copies of this article which describes how a Milwaukee, Wis. company reclaims oil from metal working operations, filters and sterilizes it. Substantial savings have been achieved.—*Editors.*

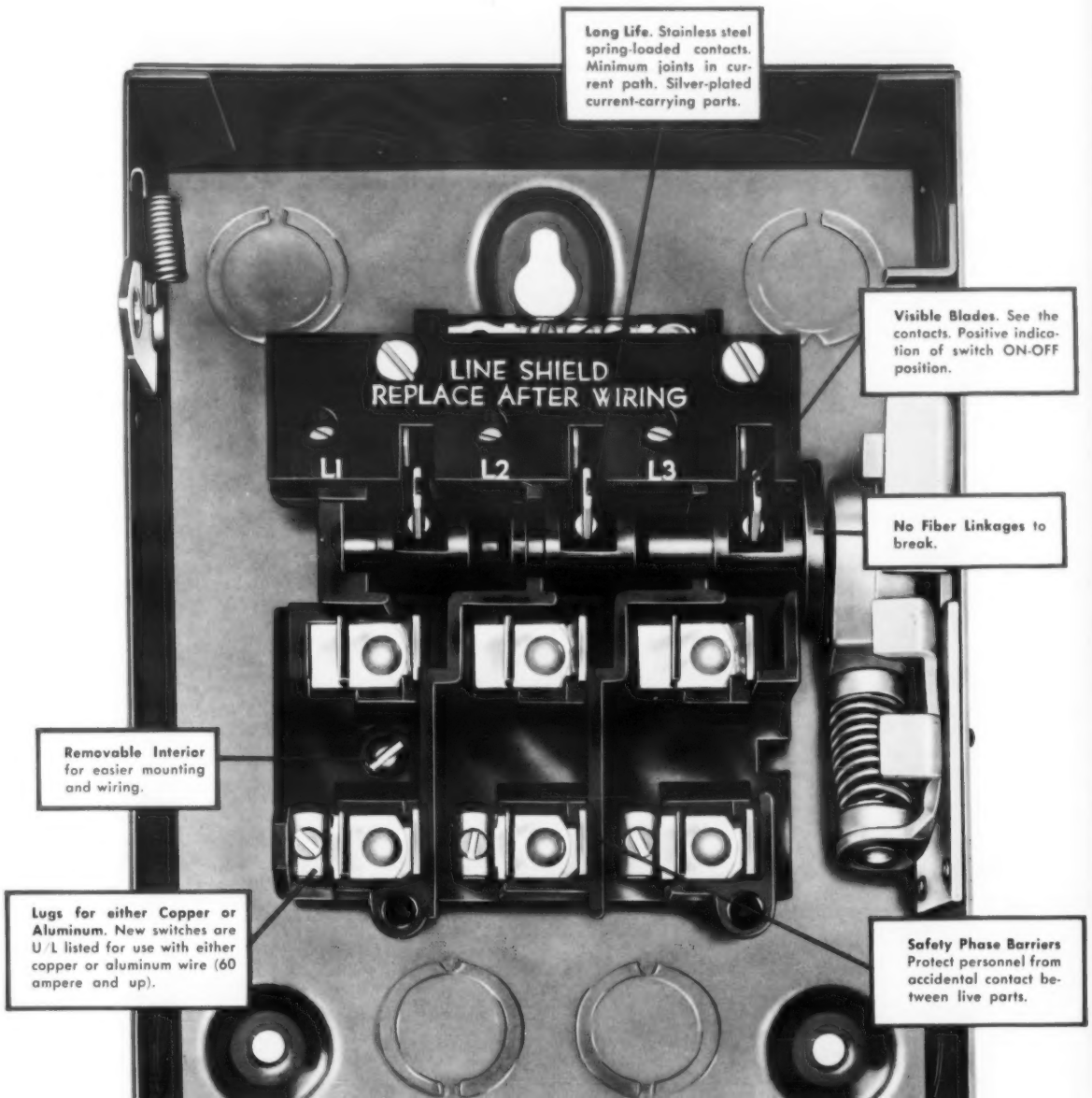
For more facts circle 525 on Reply Card ⟶

Behind this cover are bold new advances in safety switch design...

Behind this cover are bold new advances in safety switch design...

General Electric announces completely new lines of safety switches... with savings in space, easier installation, long life and maximum safety.

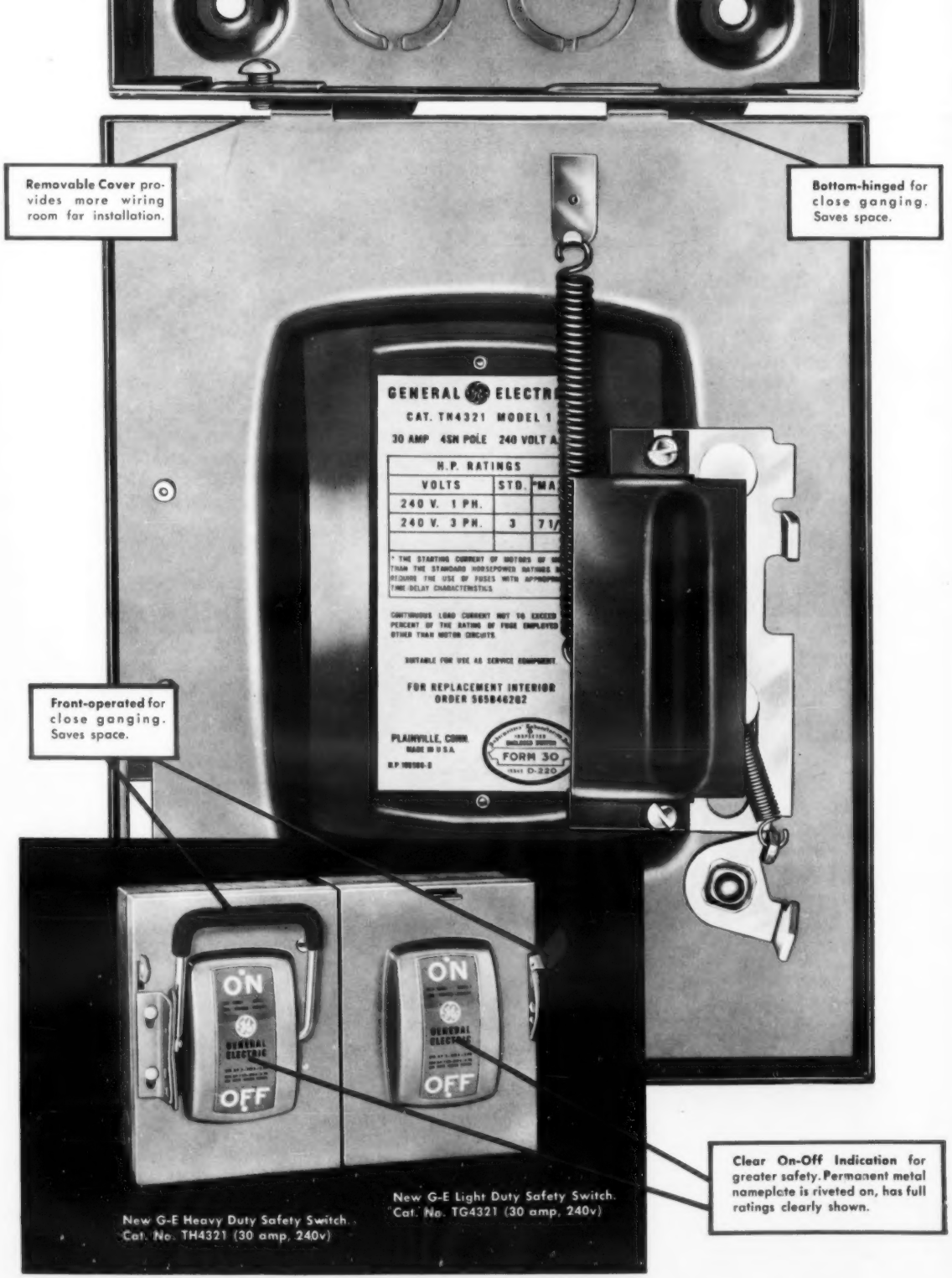
General Electric's new light and heavy duty safety switches are completely different in concept and design. And the Heavy Duty (Type A) sells at Normal Duty (Type C) price levels.


Long Life. Stainless steel spring-loaded contacts. Minimum joints in current path. Silver-plated current-carrying parts.
Visible Blades. See the contacts. Positive indication of switch ON-OFF position.
LINE SHIELD
REPLACE AFTER WIRING
L1
L2
L3
No Fiber Linkages to break.
Removable Interior for easier mounting and wiring.
Lugs for either Copper or Aluminum. New switches are U/L listed for use with either copper or aluminum wire (60 ampere and up).
Safety Phase Barriers Protect personnel from accidental contact between live parts.

Removable Cover provides more wiring room for installation.

Bottom-hinged for close ganging. Saves space.

Front-operated for close ganging. Saves space.



New G-E Heavy Duty Safety Switch. Cat. No. TH4321 (30 amp, 240v)

New G-E Light Duty Safety Switch. Cat. No. TG4321 (30 amp, 240v)

Clear On-Off Indication for greater safety. Permanent metal nameplate is riveted on, has full ratings clearly shown.

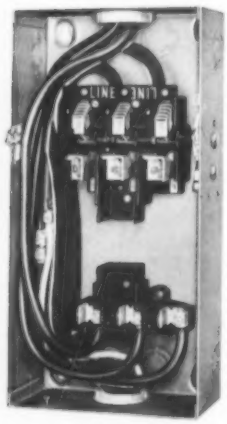
GENERAL ELECTRIC

Save space by close ganging

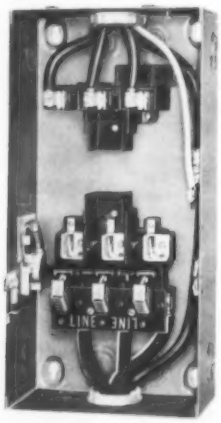
HEAVY DUTY
Bottom-hinged, front-operated

LIGHT DUTY
Bottom-hinged, front-operated

Now you can wire incoming lines at top or bottom



Old Way wastes time, work and wire. Heavy cable is hard to bend and expensive. Not necessary with new G-E safety switches.



New Way: Line lugs can be at bottom, make it easy to do a neater job in less time. ON-OFF indication is unchanged.

Both G.E.'s new heavy and light duty lines (100 ampere and up) can be wired with the line wire at the *bottom*. This saves expensive cable previously wasted, plus the time and trouble it takes to bend cable around inside of box. *And the ON-OFF indication remains the same regardless of line location.* The result is a neater, more economical installation in less time.

●

General Electric's new safety switches are fully described in Bulletin GEA6756. For your free copy, write General Electric Company, Circuit Protective Devices Department, Plainville, Connecticut.

GENERAL ELECTRIC

CPD67

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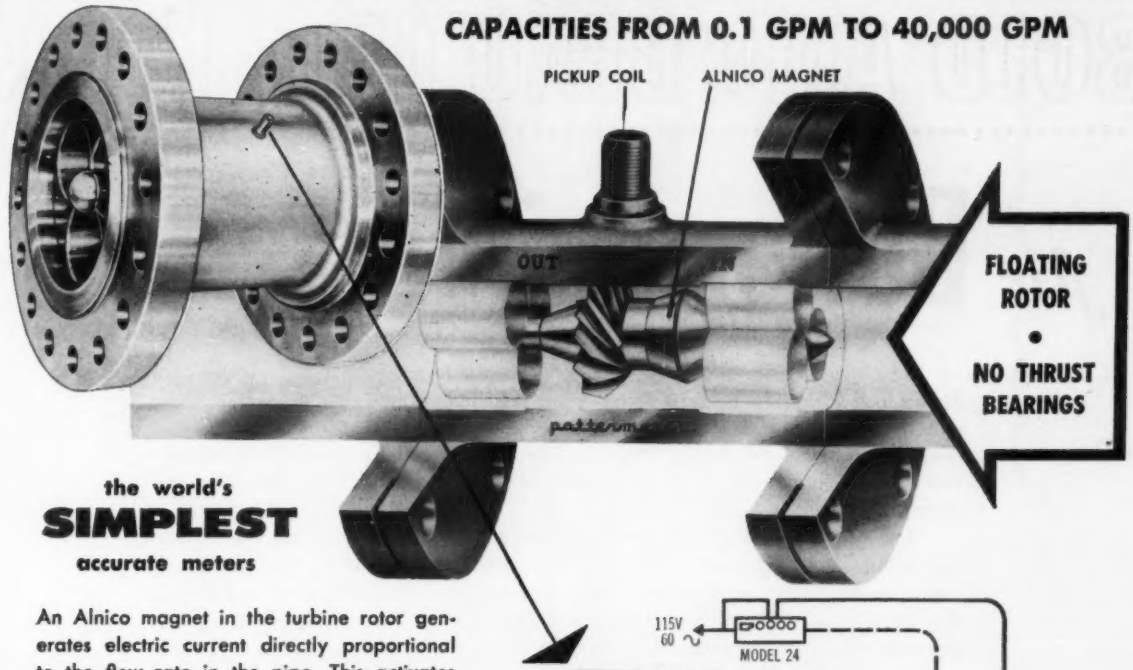
pottermeter BOWSER ESTABLISHED 1885

INLINE ELECTRONIC TURBINE TYPE METERS

CAPACITIES FROM 0.1 GPM TO 40,000 GPM

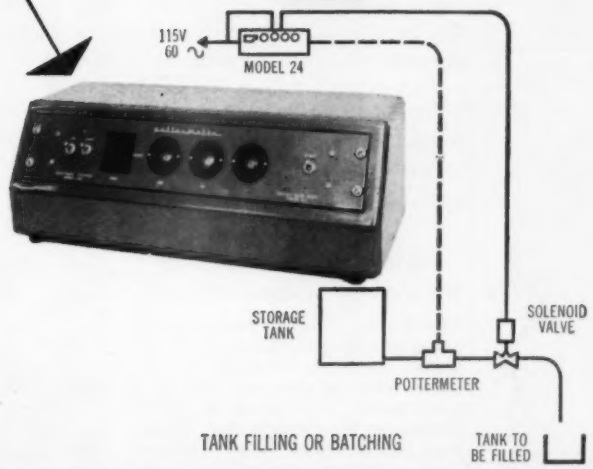


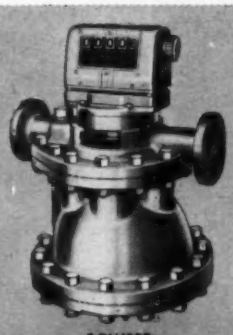
the world's SIMPLEST accurate meters

An Alnico magnet in the turbine rotor generates electric current directly proportional to the flow rate in the pipe. This activates readout or control equipment located at or remote from the Pottermeter unit.

PROVIDES BASIC INSTRUMENTATION FOR ANY AUTOMATION SYSTEM

Operating by gravity or pump pressure, Pottermeters are available in all pipe sizes. Electronic totalizers, recorders or controllers meet any need for automated liquid process or transfer operations. Potter-Bowser sales engineers in principal cities confer promptly with systems or plant engineers to detail availabilities and application data.





BOWSER XACTO METERS

BOWSER XACTO METERS AND PROPORTIONERS
positive-displacement piston type

Wherever mechanically driven readout and control equipment is indicated, and where positive-displacement metering is needed or costs less, Bowser Xacto Meters (leading all others in industry) are unexcelled for dependability and accuracy. Capacities: 6 GPH to 250 GPM

Xacto Meter equipped proportioners are used to blend two or more liquids in continuous flow at accuracies to ¼ of 1 percent. First in lube oil blending, Bowser proportioners also handle most other liquids used by process industries.

BOWSER PROPORTIONING BLENDERS

Write For Catalog

Potter-Bowser Division BOWSER, INC. Fort Wayne, Indiana

For more facts circle 526 on Reply Card

New **Butlerib**™ *panels* create the* **BOLD AND BEAUTIFUL LOOK**

for **Butler buildings**

Take a look at the new Butlerib panels being installed at the right. Notice the unique pattern. A combination of deep and shallow corrugations creates dramatic shadow lines . . . a new sculptured look. Butlerib gives industrial and commercial buildings a new, distinctive appearance. It is the new standard cover for Butler buildings—the fastest, lowest-cost way to build well.

New Butlerib panels make the Butler system of building an even better, faster way to build well. Butler pre-engineering saves countless hours of routine engineering. Butler mass-production eliminates costly custom fabrication. Precision roll-formed, new Butlerib panels fit the Butler structural system to a "T", permit fast, bolt-together assembly methods that save you weeks—even months—of costly construction time . . . put you in business and earning profits that much sooner.

Get full details on Butler buildings and new Butlerib panels from your nearby Butler Builder. Ask him about Butler financing, too. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Or write directly to us for literature.

*Patent Nos. D178605; D178659

And the most weathertight cover over offered as standard construction

New Butlerib panels are not only beautiful, they're extremely functional. The new corrugated pattern makes them the strongest, most rigid cover panels ever offered on Butler buildings. This means that there's even less deflection under wind and snow loads. Joints stay tight and snug.

Butlerib panels offer maximum protection at lowest cost. Secured with modern self-clinching fasteners (see photo at right), Butlerib panels are installed quickly . . . economically. And they do not require the costly maintenance and repairs of traditional construction.

BUTLER®

BUTLER MANUFACTURING COMPANY

7529 East 13th Street, Kansas City 26, Missouri

Manufacturers of Metal Buildings • Equipment for Farming, Dry Cleaning, Oil Production and Transportation, Outdoor Advertising • Contract Manufacturing

Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. • Cleveland, Ohio • Pittsburgh, Pa. • New York City and Syracuse, N.Y. • Boston, Mass. Washington, D. C. • Burlington, Ontario, Canada

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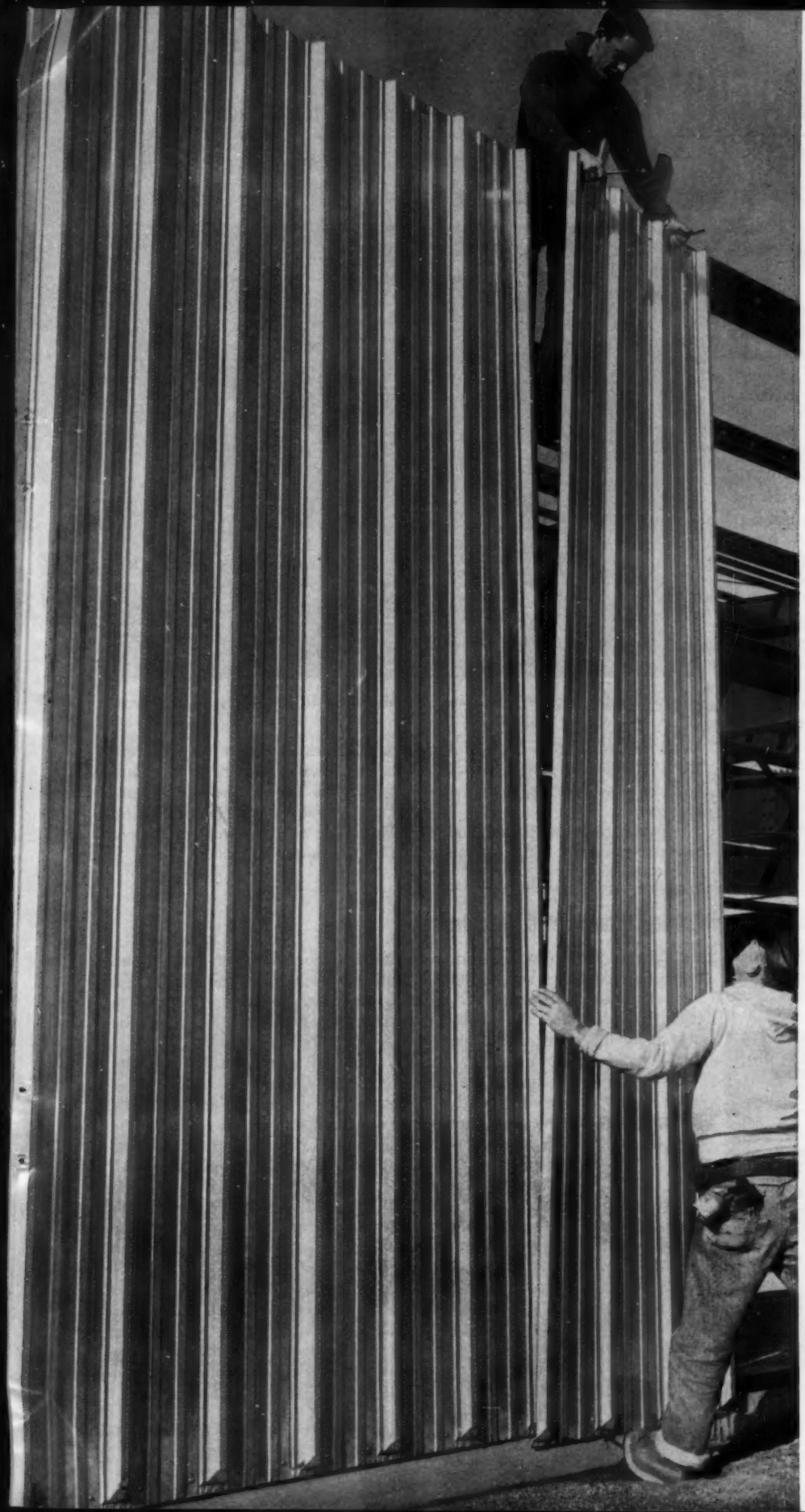
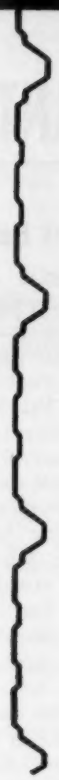




A full 3 feet wide and available in lengths up to 32 feet, Butlerib panels make short work of covering even the largest Butler buildings. The unique pattern of deep and shallow corrugations makes these the most rigid panels of their type.

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

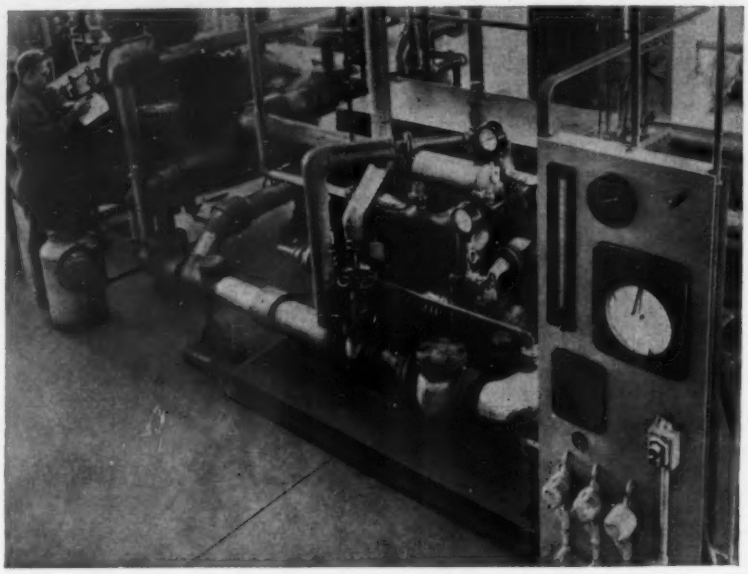
Edited by Marjorie E. Weissman

Packaged Electric System Used for Heating and Cooling Reaction Kettle

TO HEAT AND COOL a jacketed kettle for unusual reaction conditions, a packaged system using electric resistance heating units has been designed by Hoffman La Roche, Inc. The 100-kw unit raises kettle temperatures to 550 F under close control. Cooling is provided by a heat exchanger that is incorporated into the system.

Electric heating was preferred for this job as the temperatures needed would have required 700 psi steam. The unit operates at 50 psi.

The electric heater is a self-contained, packaged, multi-pass, hot-oil transfer unit. A heat-transfer oil designed for use at 600 F maximum, is heated in the unit and pumped, in a closed circuit, to the processing vessel. When cooling is required, the transfer oil is diverted by valves through the heat exchanger.



Jacketed kettle (top left) is heated by oil raised to 550 F by electric heat.

The heater, designed to raise the temperature of 200 gal transfer oil from 70 F to 518 F in 1 hr, consists of 16 multi-pass steel tubes, each with a capacity of 6.25 kw. It operates on 3-phase, 60 cycle, 440-v current. The heating elements are wired in increments of 25 kw each for close temperature control. A 3-hp, motor-driven pump provides a high oil velocity through the heater passages.

The control panel is designed for remote operation. The instrument panel is installed two feet from the heater itself. Heater, motor and controllers are explosion-resistant. *From a release of Hynes Electric Heating Div., Turbine Equipment Co., Mountainside, N. J.*

Blast Furnace Returned to Work by Repairing Columns With Iron Cement

WHEN RELINING of No. 2 blast furnace at Pittsburgh Steel Company's Monessen, Pa., plant was undertaken in 1957, it was found that the bracket castings supporting the revolving distributor ring had become badly warped. As a result, a new revolving distributor that was installed did not seat properly.

Column, center, is one of 5 reseated.

Scallop-type warping on the bracket coatings created voids up to one inch in thickness on the ring coatings which measure 6 in. wide by 54 ft. circumference. The void had to be eliminated to prevent furnace gas leaks.

There were two possible solutions: install new top ring support castings, or fill the voids. Since the latter was the more economical solution, saving the cost of castings and further delay in returning the furnace to production, that solution was chosen.

The filler selected had to withstand temperatures of 800 F and above, and pressure of 120 in. water gage. It had to perform in such a way that the fill would be absolutely gas tight.

The job was accomplished with an iron cement. A maintenance problem in another area of the same furnace was solved with the same material. This time the base support columns were involved. Columns measure 42 in. by 60 in. at the base and top. Five of the 12 columns, base and top plates, were warped, again posing the problem of seating.

Ordinarily filling the voids and leveling up the columns would have called for a grouting job. In this case, however, the voids were ac-

(Continued on page 42)

NEW . . . by CROUSE/HINDS

ARK-trol®

ELECTRICAL CONNECTORS

• Foolproof polarization • Errorless assembly • Maximum interchangeability • Environmental: Exceed rigid military and industrial requirements for resistance to corrosion, chemicals, high and low temperatures, pressure, shock, vibration, dust, humidity, moisture, and leakage of air.

POSITIVE POLARIZATION

Completely foolproof: plug can be mated only with proper receptacle, and in only one way . . . the *right* way. Unsymmetrical contact arrangements preclude improper mating of contacts, or mating of unmatched contact configurations.

FAST, EASY, ERROR-FREE ASSEMBLY

Polarization keyways and unsymmetrical contact arrangement in insert assemblies make improper assembly of parts impossible. One-piece 'snap-in' connectors. Soldering is done outside . . . *before* insertion of contacts.

SEALED AGAINST ENVIRONMENTAL FACTORS

'Stack' assembly includes silicone rubber wafer for impenetrable seal against water, vapors, dust, gas. Basic shells, other metal parts are high-strength extrusions of aluminum alloy, anodized for corrosion, abrasion resistance: 1800 volts are required to penetrate this coating.

MAXIMUM INTERCHANGEABILITY

Components in each diameter are interchangeable and reversible, doubling scope of equipment. Male *and* female shells take either pin or socket inserts: both plug and receptacle may be used 'hot' or 'dead'. Pin and socket configurations available in wide range . . . specials supplied on request.

SHELL SIZES and ELECTRICAL RATINGS

Four shell sizes: from 1-1/16" to 2-9/16" diam. *Voltages:* Military Service Ratings: A, D, E, B, C and Instrument. NEC Rating: 600V. A.C. *Contact sizes:* #16 to #4/0 inclusive. Write for Bulletin 2711 containing complete descriptions, specifications and configuration patterns for both Type RPE and RPC *ARK-trol* Electrical Connectors.

Available in two types:

TYPE RPE ENVIRONMENTAL
- Moisture Proof
- Shock Insulated
- Dust-Tight
- Corrosion Resistant
- Grounded & Non-Grounded

TYPE RPC CIRCUIT BREAKING
- All Features of RPE *Plus* . . .
- Circuit Breaking under full Rated Load

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For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

tually too narrow to permit a good grout.

Again, Pittsburgh Steel used iron cement between the metal surfaces.

With its support columns leveled and its new top-ring casting fitting gas tight, the blast furnace was returned to full production without the costs and downtime usually required for repairs of this type. *From a release of Smooth-On Manufacturing Co., Jersey City, N. J.*

Pipelines Lined in Place

CONCRETE AND METAL pipelines are now being reconditioned in place by lining with acid-resisting epoxy resin.

The lining has been developed for pipelines that are subjected to excessive acid attack, such as sewer and industrial waste lines. Pre-mixed epoxy resin is applied with special machines that travel through pipes from 24 to 144 in. in diameter. These machines apply lining material by centrifugal force from a high-speed revolving head, then smooth the lining with automatic trowels.

A variety of epoxy resin linings with a minimum thickness of one-eighth inch can be placed in a single pass. Linings consist of pure resins extended and pre-mixed with inert filler materials.

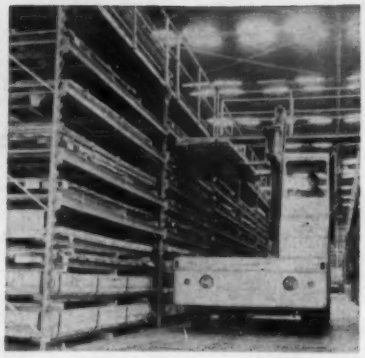
The resin provides a tight bond with pipe materials. Variation of extender ratios can produce a wide range of compressive and tensile results. Most common ratios produce compressive strengths of more than 7,000 psi, and tensile strengths of more than 1,500 psi. *From a release of Centriline Corp., New York, N. Y.*

Sheet Metal Storage and Handling

UNDER THEIR OLD materials handling system at Convair, Fort Worth, Tex., sheet metal was stacked in random piles and required 75,000 sq ft for storage. Often an entire stack had to be moved to reach a particular gage of metal at the bottom of the pile.

The problem was solved by extending the storage area vertically. Racks measuring 15 ft high by 12 ft wide, grouped 12 or six units to a row, were installed. Aisles are 12 ft wide. Upwards of 52,000 lb of material is now stored on adjustable shelves in 45,000 sq ft of space.

Materials are segregated in marked shelves and handled only twice—when they are stocked and when they are removed for production purposes. A Traveloader side-loading lift truck is used to handle the metal. Each can fill 90 orders in the same time that it took four or five men working with an overhead crane to fill 22 orders under the old system. *From Otis Bulletin, published by the Otis Elevator Co., New York, N.Y.*



Adjustable shelves and side-loading truck solved metal storage problem.

Transporting Bulk Chemicals

A BULK MATERIALS trailer, equipped to load and unload itself pneumatically, was recently put into use by the City of Providence, R.I. Water Supply Board to trans-

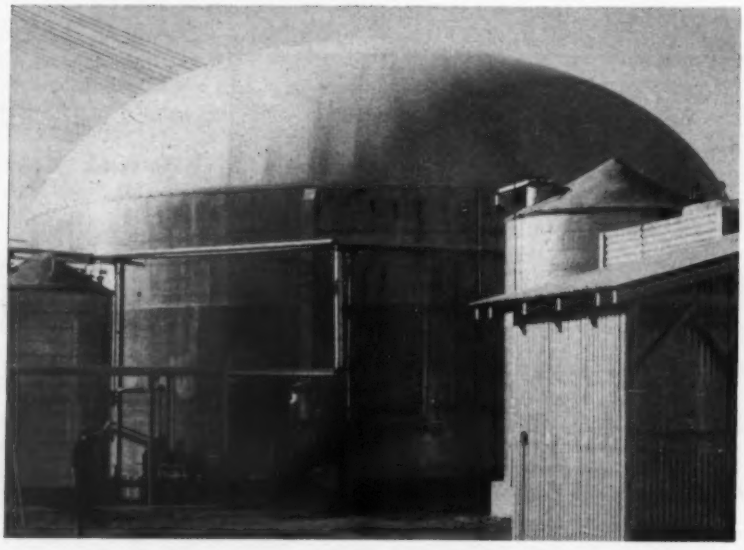
(Continued on page 44)

Air-Supported Synthetic Fiber Roof for Storage Tank Saves Construction Dollars

THOUSANDS OF DOLLARS were saved in construction costs at our new plant in California by topping a 60-ft diam tank with an air-supported roof of plastic-coated synthetic fiber. The storage tanks, used for urea, are normally roofed with rigid metal.

The air-supported roof is held by a clamping ring bolted to the tank and is kept inflated by a constant stream of air. If the air blower should stop due to a power failure, the roof would stay inflated for a day.

Flexibility of the roof helps it resist winds of hurricane force. Made by the Irving Air Chute Co., it has a life expectancy of five years. *From The Hercules Mixer, published by Hercules Powder Co., Inc., Wilmington, Del.*



Air holds up plastic-coated synthetic fiber roof. Air blower and air shaft center.

It's a multipurpose grease . . . but *how* multipurpose?

You can't "feel" the answer. Any "multipurpose" grease you buy is a compromise. Lubrication engineers say it *can't possibly be* the best lubricant both for high speeds and low loads . . . and for low speeds and heavy loads. It's *got to be* somewhere in between, so that it can do both jobs fairly well.

What you should do is decide on *which* multipurpose grease is best for you. This is a decision for an expert team—you and your Sun representative—because you have to consider many variables.

We feel, justifiably, that one of Sun's Prestige Multipurpose Greases is designed with that wide range of applications you're looking for. They last longer under pressure, water, heat, and other abuses. They bear investigation. To start enjoying the real economy of quality, call that Sun man today—or write

SUN OIL COMPANY
Philadelphia 3, Pa. Dept. PY-6.
In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

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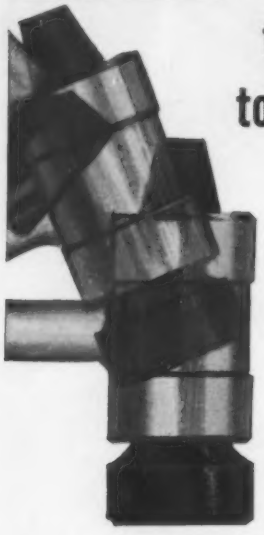
COUNT ON SHURE-SET



the "power-concentration" tool that revolutionizes light fastening!

With Shure-Set's unique "Power Transfer" design, you can drive pins and threaded studs right through light-gauge metal into concrete with a few strokes of a hammer. The hammer-driven Shure-Set light fastening system is ideal for carpenters, plumbers, electricians, builders, and maintenance personnel for quick, reliable fastening into steel, concrete, or building block... no drilling or cartridge required.

Shure-Set supports the fastener until it is driven home . . . no duds, no bent studs or pins, no smashed thumbs. Try Shure-Set and you'll save time, money, and temper while doing a better job. Look for your Shure-Set dealer under "tools" in the yellow pages.

In addition to hammer-in Shure-Set, the versatile Ramset Fastening System includes Ramset powder-actuated method for heavier fastening, and Ringblaster® heavy-duty kiln gun.

OLIN MATHIESON CHEMICAL CORPORATION Shure-Set®

Ramset Fastening System

WINCHESTER-WESTERN DIVISION • OLIN MATHIESON CHEMICAL CORPORATION
12133-F BEREA ROAD • CLEVELAND 11, OHIO

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

In unloading position, material is funneled through rotary feeder and injector into conveying line leading to storage.

port water treatment chemicals from a railroad siding to the plant, a distance of eight miles.

Using the suction side of the conveyor system, the trailer can be loaded directly from railroad boxcars or hopper-bottom chemical cars. This operation is vented by a bag-type dust collector.

To unload, the tank is lifted hydraulically above the angle of repose of the material. Material slides down into an injector where it enters a pressure line running beneath the trailer. Contents of the dust collector are also discharged into this line. Flexible conveying line reaches from injector to plant storage facilities. *From a release of Dracco Div. of Fuller Co., Cleveland, Ohio.*

Spools Move Free and Easy From First to Second Floor

THE PROBLEM of efficiently moving large spools of yarn during their processing cycle from the first to the second floor in a two-story structure, was solved by Draper Bros., Canton, Mass., by installing an overhead power and free conveyor. This installation utilizes 1300-ft of gravity track driven by 500 ft of powered conveyor track. Powered track moves at the rate of 30 fpm.

The power loop circles the first floor to service load stations. Loaded carriers, which may weigh as much as 160 lb, rise at a 35 deg angle to the second level on specially de-

JENKINS

O.S.&Y. U-BOLT GATE

MADE BETTER THAN NEED BE . . .

Costs Less to Use

YOU PAY NO MORE for the extra quality you see in every part of a Jenkins Outside Screw & Yoke U-Bolt Gate valve. Yet longer life and reduced maintenance is bound to result from the extra ruggedness, the precision manufacture and unique design features which Jenkins puts into these popular, general utility valves.

Choose the Outside Screw & Yoke pattern for services where spindle threads must be kept out of the destructive effects of fluids in the line; where spindle threads must be cleaned and lubricated regularly or where a rising spindle is needed to indicate wedge position.

Choose JENKINS, whether O.S. & Y. or Inside Screw pattern, for valves built to save maintenance dollars.

WIDE RANGE OF JENKINS U-BOLT GATES

GET FOLDER NO. 207 which describes Inside Screw and O.S. & Y. patterns . . . Iron Body with Bronze or Stainless Steel Mounting . . . All-Iron and Ni-Resist with type 316 Stainless Steel trim. Ask your local Jenkins Distributor or write Jenkins Bros., 100 Park Avenue, New York 17.

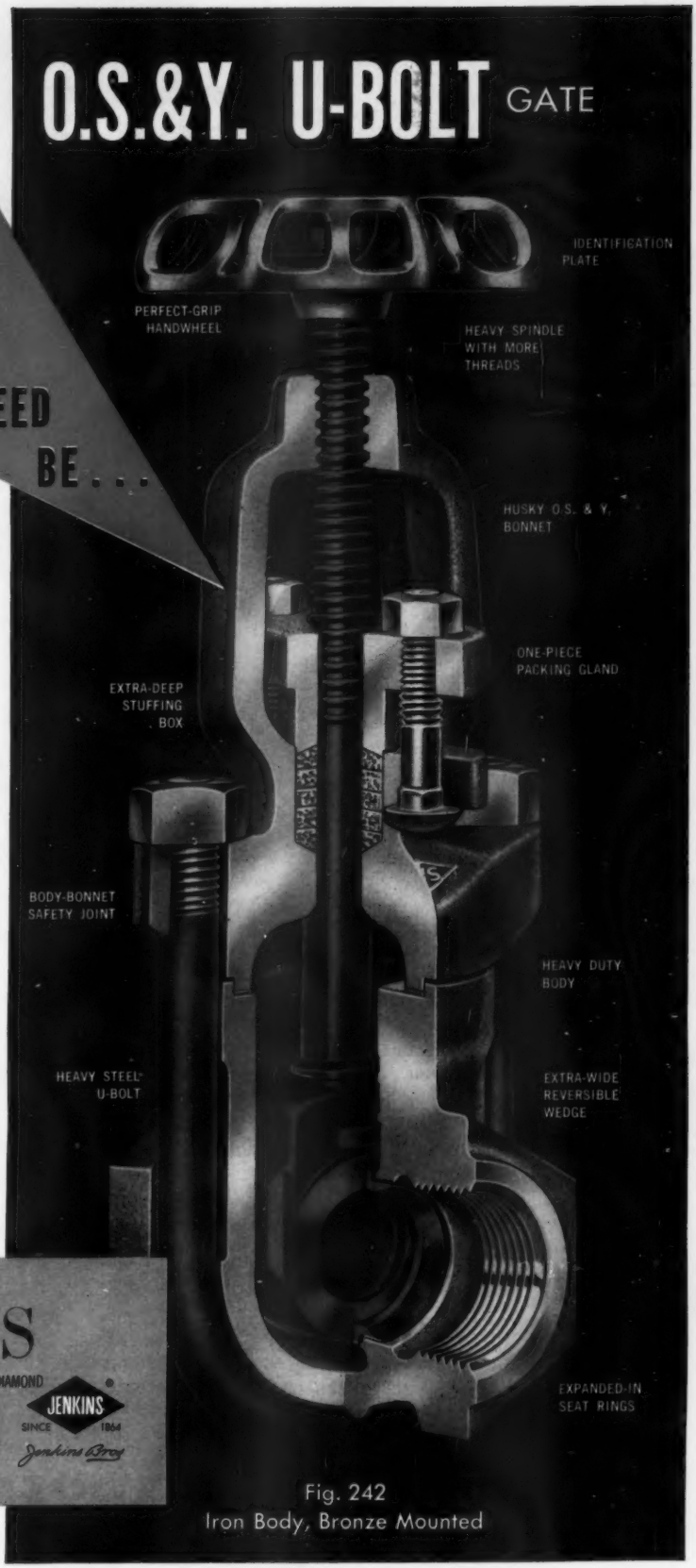


Fig. 242
Iron Body, Bronze Mounted

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS SINCE 1864 Jenkins Bros.

Sold Through Leading Distributors Everywhere

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5172-GS-B set

(¼ to 1¼-inch wrench size range)

Service factory machinery, engines, cars, trucks, plant utilities and material handling equipment with this handy set of *Snap-on* tools.

Space-saving compactness puts 172 tools in one portable, "quick-select" chest. Sturdily built from welded, heavy-gauge steel, the chest is easily transported from tool crib to job, from plant to field service — wherever it's needed.

The kit is complete enough to handle practically all of your general service requirements. And top-quality *Snap-on* tools fit better, last longer — cost you less in the long run.

We can also help solve your maintenance and service problems with specially tailored sets to meet your needs. Call the nearest *Snap-on* branch for more information — or write direct.

NEW SAFETY FILM

A new *Snap-on* tool safety film is now available for showing in your plant. Write us and schedule it for mechanics and safety supervisors soon.

SNAP-ON TOOLS
CORPORATION
8068-F 28th Avenue • Kenosha, Wisconsin

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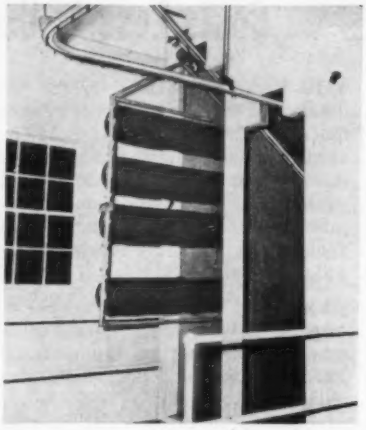
PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

signed carriers. These carriers are spaced 30 ft on center under power.

On the second floor, after carriers travel some 100 ft, they enter an automatic switch station actuated only by index flags on loaded carriers. Loads are routed automatically to an 80-ft gravity line, and from this point to any one free line for in-process storage.

Empty carriers are returned to the first floor after being unloaded on the second. These empty carriers are moved around unloaded until needed at one of the 13 separate



Power and free conveyor rises at 35-deg angle to carry spools to second floor.

loading stations, each with an automatic switch. Once the carrier has been loaded, an index flag on the carrier is reset and it begins the trip to the second floor switch station. *From a release of Chainveyor Corp., Los Angeles, Calif.*

Quartz-Lamp Furnace

A QUICK-HEATING furnace which will reach a temperature of 3500 F in 90 seconds, has been developed by our engineers. It is used for performing laboratory tests at elevated temperatures.

Furnace consists of 30 quartz lamps arranged in a circle with a copper water-jacket cooling system around them. The cooling system enables the lamps to be operated at more than twice the manufacturer's rating and at the same time prevents the lamps and con-

DURACO® VINYL INDUSTRIAL TILE

Built to take GREASE

Every industrial floor should be able to resist greases and oils commonly used in most manufacturing operations. Duraco does this superlatively well – because it's made with a *vinyl resin* binder that is unaffected by petroleum products.

This remarkable industrial flooring is built to perform better in plant or factory. It's grease-proof and acid-resistant – easier and safer to walk and work on, much easier and quicker to clean. It's designed to cut floor costs per square foot per year in your plant. Let Duraco prove itself in your plant without obligation to you. Our representative will be glad to discuss the details of the Duraco Test Area Program with you.

SPECIFICATIONS

Available in 5 terrazzo colors, 5 marbleized colors – coordinated with accepted industrial color standards. Size 9″ x 9″. Thicknesses: Standard Gauge 3/32″ – Heavy Gauge ⅛″.

AZROCK FLOOR PRODUCTS DIVISION
UVALDE ROCK ASPHALT CO.
572 FROST BANK BLDG. • SAN ANTONIO, TEXAS

AZROCK FLOOR PRODUCTS DIVISION
572 Frost Bank Bldg. San Antonio, Texas

We are interested in Duraco. Please have your representative call to discuss the Test Area Program with us.

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INTRODUCING...

NOW...
select from a complete range of capacities and speeds...1/8 to 2 tons and 8 to 60 fpm.

important new models of the Lodestar® electric hoist

NEW MODELS in 1/2, 1 and 2 tons

LODESTAR FEATURES INCLUDE:

- Safe, Heavy Duty Performance
- Lowest Headroom
- Push Button Control
- Fully Enclosed Components
- Self-Adjusting Magnetic Brake
- Ultra-Modern Electric Braking
- CM-ALLOY Flexible Link Chain
- Minimum-Maintenance Operation
- Lifetime Lubrication

Request catalog and name of local stocking distributor.

LARGER CAPACITY and FASTER SPEEDS
...for speedier, lower cost materials handling

● Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements. Many thousands already in service demonstrate that you, too, can benefit from more efficient handling, lowered costs and increased productivity.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
Columbus McKinnon Chain Corporation
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In Canada: McKinnon Columbus Chain Ltd., St. Catharines, Ont.
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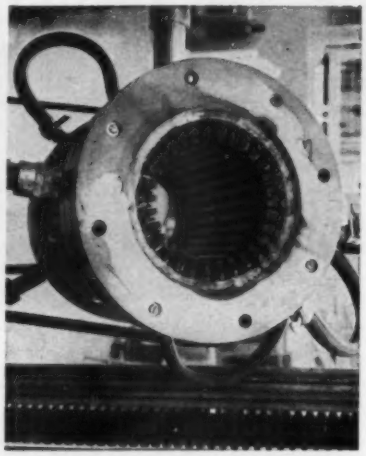
PLANT ENGINEERS' DIGEST

(Digest begins on page 40)



Water-cooled quartz-lamp furnace reaches 3500 F in 90 sec. Inner surface is gold-plated for good heat reflection.

nectors from melting. Maximum power jump is from 1000 w to 2700 w per lamp.

The inner surface of the furnace is gold-plated for better heat reflection. *From a release of Boeing Airplane Co., Seattle, Wash.*

Special Lubricants Reduce Gear Wear

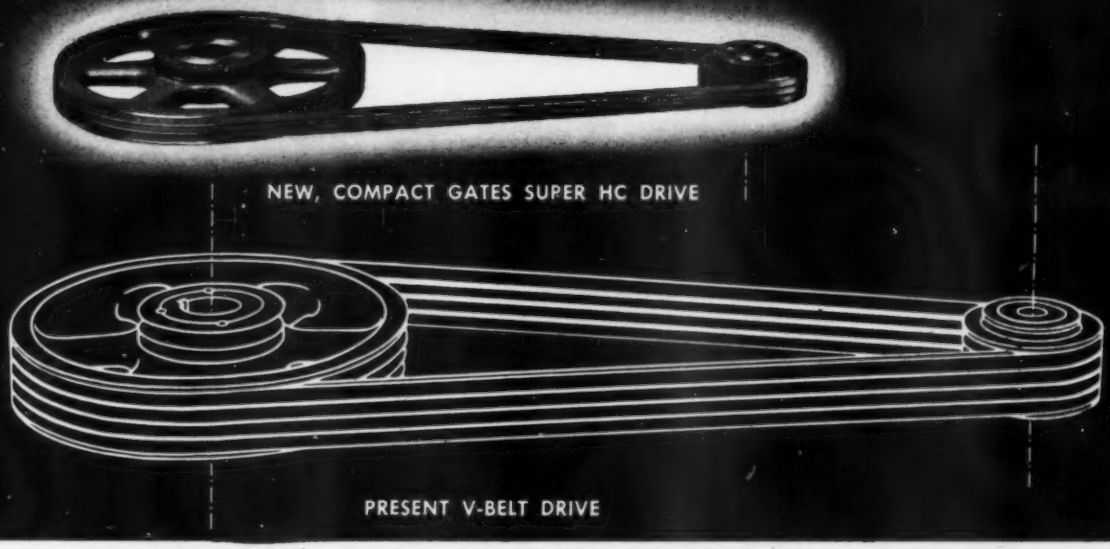
A SOUTHERN company engaged in the extraction of oils from cotton seeds, soy beans and other vegetables, has realized great savings in maintenance, labor, parts, and machine downtime by careful choice of lubricants for use on processing machinery.

Cooked seed meats at 255 F are fed to four screw press extracting machines. Operating at 36 to 45 rpm, these expellers place a heavy strain on their drive gears and lubricant in which they run.

For the helical and spur gears of the expeller drive units, and the hypoid gears and roller bearings of their two cookers, the company selected a custom lubricant. In 28 months (more than 16 thousand working hours) of operation there has been no bearing or gear damage due to lubricant breakdown, nor accumulation of gummy material on gear spokes or sludge in the gear cases.

The company also noted a cor-

New high capacity V-belt revolutionizes drive design



NEW, COMPACT GATES SUPER HC DRIVE

PRESENT V-BELT DRIVE

Makes drives far more compact... cuts cost as much as 20%

Here is a major advance in the field of power transmission — the fully proved Gates Super HC V-Belt, developed in the world's largest belt-testing laboratories at The Gates Rubber Company.

The Gates Super HC V-Belt makes possible the lowest-cost, lightest-weight, most compact multiple V-belt drive that can be put on any machine! Sheave diameters can be reduced up to 50%, sheave widths 30% to 50%, center distances 20% and more.

On new drives, the cost of a Gates Super HC V-Belt Drive is as much as 20% less than present V-belt drives of the same horsepower capacity.

Learn more about the cost-saving Super HC Drive

For detailed information on the Super HC Drive, contact your nearby Gates distributor or Gates Office for new booklet, *"The Modern Way to Design Multiple V-Belt Drives."*

For utmost space, weight and dollar savings in new drives or drive replacements, specify Gates Super HC V-Belts and Sheaves. Stocks immediately available in principal industrial centers.

How savings multiply with Gates Super HC V-Belt Drive

Cost of a new Gates Super HC V-Belt Drive is as much as 20% less than cost of a drive of comparable horsepower using present V-belts. In addition to the lower cost of the drive itself, further economies are realized on housings and bases — economies in materials, production time, shipping costs.

Shown below are space savings of a typical installation...

	DriveR Sheave Diam.	DriveN Sheave Diam.	Center Distance	No. of belts
Present Drive	7.4"	20.0"	42.9"	4
Super HC Drive	5.3"	14.0"	30.0"	3

The Gates Rubber Company, Denver, Colorado • Gates Rubber of Canada Ltd., Brantford, Ontario

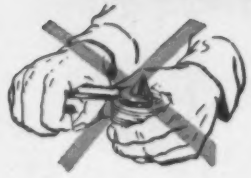
Gates

World's Largest Maker of V-Belts

Gates Super HC V-Belt Drives

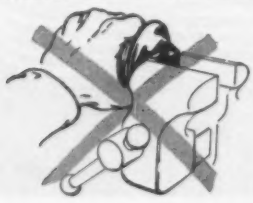
For more facts circle 535 on Reply Card

Now . . . from Barnes & Jones . . . the BIGGEST DROP in Steam Trap Maintenance in 50 Years!



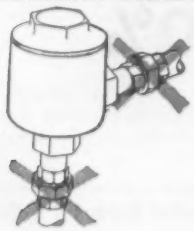
No parts — no assembly.

Barnes & Jones has been recognized for over half a century as a leader in thermostatic traps for the heating trade. Now — the same basic cage unit feature that revolutionized radiator traps thirty years ago is available for high pressure process steam applications.



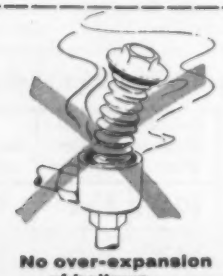
No special tools or shop required.

Now — costly, time-consuming steam trap repairs are outmoded. For with this new B-J Cage Unit replacement, you simply drop a complete new interior into the trap and it's new again. And if steam trap maintenance is a bugaboo with you — it's the best and biggest drop you can make.



No need of unions.

Also — Barnes & Jones Cage Unit interiors are available to renew other makes of industrial traps.



No over-expansion of bellows.

If you're interested in saving steam, cutting repair and maintenance time and improving trapping efficiency, write today for "The Steam Trap Primer". You'll see the 'hows' and 'whys' of steam trap performances. And perhaps you'll see how B-J high pressure traps and cage units can end your steam trap problems.

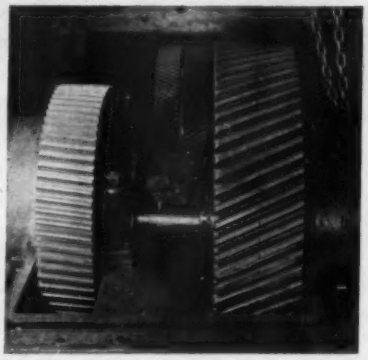
Be Wise . . . Be Sure . . . B-J

BJ

Barnes & Jones, Inc.
34 Crafts Street
Boston 60, Massachusetts

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)



Helical gears and pinions, operating with special lubricant, are in good condition after 28 months of heavy duty. Lubricant in the gear bath did not need changing during this period.

rosive condition on the splines which connect the drive to the screw press, due to ammonia and some acid in the cotton seed oil. The edges were becoming rounded —not remaining sharp as they should have been. A coating of acid-resistant lubricant was put on the splines and an inspection made six months later showed that deterioration had stopped. Splines are now being protected with this lubricant which is also used on expeller case bolts—makes the nuts easier to remove. *From a release of Keystone Lubricating Co., Philadelphia, Pa.*

Multi-Purpose Truck

Unit under test by Army QMC, has front end that converts from forks to crane, is used to handle missile sections. It is self-loading truck, towing tractor, crane. (From a release of Clark Equipment Co., Battle Creek, Mich.)

LINK-BELT MOTOGEARS . . .

flexible motor selection

durable hardened gearing

available from stock

LINK-BELT Motogears permit smaller spare motor inventory

Motor's down! No time for delay! And no *need* for delay with a Link-Belt Motogear on the job. Pick a motor—*any enclosure—any make*—and switch in minutes. No need to drain oil. As for re-alignment, the rigid bracket makes it automatic.

Design-wise, there's none better. Among its features: oil-tight cast housing; quiet, hardened gears; straddle-mounted pinion that easily shoulders shock, reversing or heavy loads.

Double, triple and quadruple-reduction Link-Belt Motogears are carried in stock. Ratio range: 6.2:1 thru 985:1 . . . up to 100 hp.

FOR FULL-LINE FACTS

on Link-Belt's comprehensive line of speed reducers—contact your nearest Link-Belt office or authorized stock-carrying distributor . . . or check and send this coupon to Link-Belt Company for data on all or any combination of the following:

- ☐ gearmotors
- ☒ motogears
- ☐ helical gear speed reducers
- ☐ shaft-mounted speed reducers
- ☐ worm gear speed reducers
- ☐ universal worm gear speed reducers
- ☐ parallel shaft speed reducers
- ☐ fluid drives
- ☐ P.I.V. speed changers

LINK-BELT

15,110

PRUDENTIAL PLAZA, CHICAGO 1, ILL.

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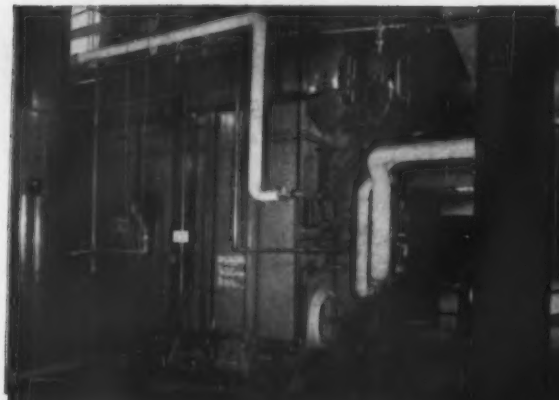
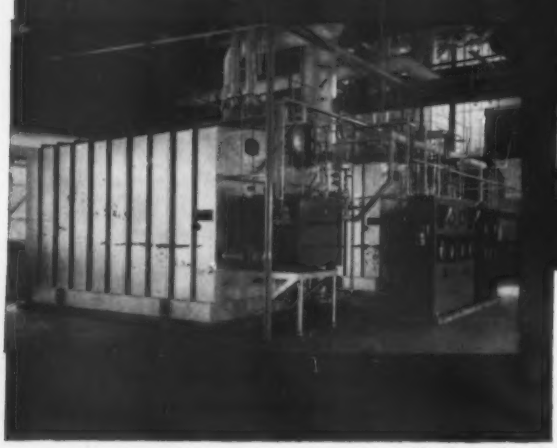


More Steam per dollar of investment with Vogt

PACKAGE WATER TUBE BOILERS

Completely shop fabricated, with burners, controls and accessories installed before shipment.

Placed on a suitable foundation, only fuel, water, breeching and steam connections need to be made to place unit in operation. Vogt Package boilers are available in oil and/or gas fired types in standard pressures of 175, 250 and 375 pounds per square inch gage.



Write for literature Address Dept. 24A-BPLE

HENRY VOGT MACHINE CO.
LOUISVILLE, KENTUCKY

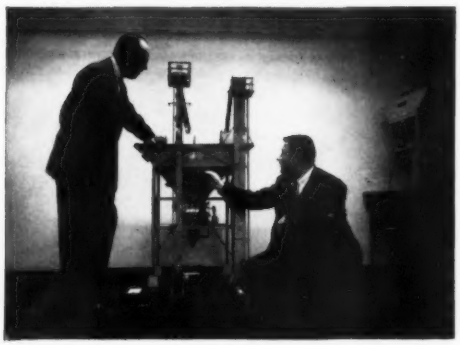
SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati

For more facts circle 538 on Reply Card

Bill St. John (left) with Heltzel Chief Engineer, W. J. Kirchner, who said: "As a result of Bill's recommendation, we're using Jeffrey's combination chain. It's economical, yet gives the needed strength in our higher elevators."

"Jeffrey gives us the kind of service we want"

Heltzel buyer, John Holodnak (right): "It's strictly service as far as Jeffrey is concerned with us. Jeffrey gives us quotations in two days or less. They stock for us. Delivery is no problem."



The Heltzel Steel Form & Iron Company, of Warren, Ohio, manufacturer of concrete batching plants, now looks to Jeffrey for power transmission components. Heltzel engineers and buyers agree that Jeffrey gives them the kind of service they want.

Commenting on Jeffrey service, Heltzel Chief Engineer, W. J. Kirchner stated, "Originally, Jeffrey's Director of Research came to Heltzel with Bill St. John (Jeffrey Northeast Ohio Sales Engineer). They sat down and discussed our needs – Bill knows what he's talking about. We understand each other. We have followed his recommendations in many instances."

Find out exactly how Jeffrey delivers the kind of service you ought to have. Arrange a meeting through the Jeffrey office nearest you, or contact: Manager, OEM Sales, The Jeffrey Manufacturing Company, 905 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

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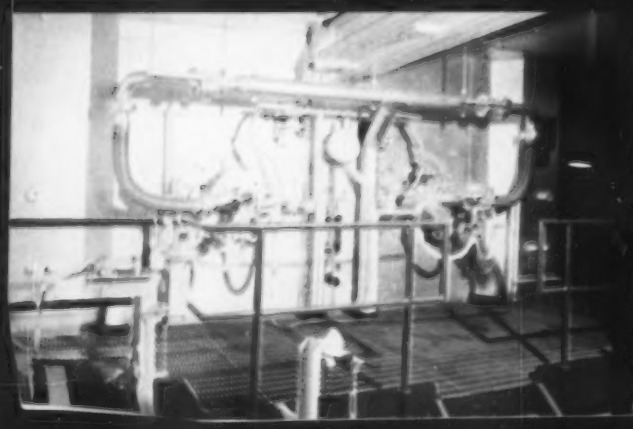
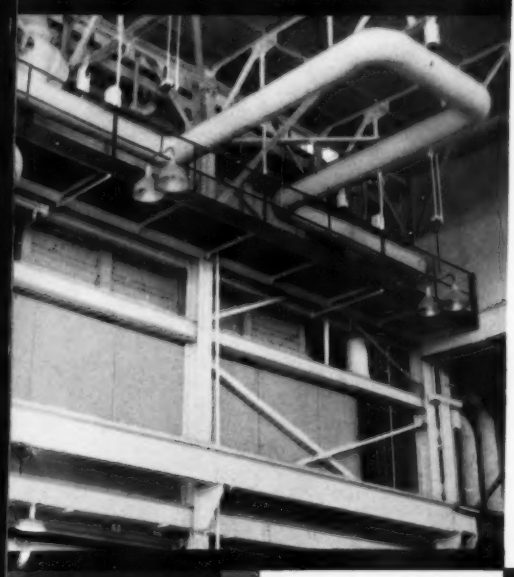
Bright, modern, functional

COLORS





...another important **Difference** in the Rust-Oleum System

How many coating manufacturers offer you a *complete system* that Stops Rust—and provides lasting beauty over the years? The Rust-Oleum *System* does just that.

First—apply Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface, after scraping and wirebrushing to remove rust scale and loose rust. The *specially-processed* fish oil vehicle in the primer penetrates rust to bare metal—merging the rust into the coating—saving costly surface preparations. *Second*—the wide variety of colors in Rust-Oleum finish coatings provides lasting beauty over the primer. Your choice of practically all colors from bright enamels to soft, restful pastels—all formulated for long over-the-years protection.

What is your coating problem? From Heat Resistant, Chemical Resistant, and Machinery Finishes to Heavy-Duty Top Coatings for use indoors and out—Rust-Oleum has the coating to meet your needs and the *system* for lasting beauty. Consult your Rust-Oleum Industrial Distributor . . . he has complete stocks for your use in maintenance, new construction, and remodeling. His experience can serve you well.

A matter of excellence.
Distinctive as your own fingerprint.

RUST-OLEUM®

STOPS RUST!®

RUST-OLEUM IS AVAILABLE IN PRACTICALLY ALL COLORS

SEE OUR CATALOG IN SWEET'S

STOP RUST

with

RUST-OLEUM

769 Damp-Proof Red Primer

Eliminate costly surface preparations and save time, money, and metal. Just brush Rust-Oleum 769 Damp-Proof Red Primer right over the sound rusted surface—after scraping and wirebrushing to remove rust scale and loose rust. You can do this because the **specially processed fish oil vehicle** penetrates rust to bare metal—as proved by radioactive tracing studies.

SEND FOR FREE TEST SAMPLE! ATTACH TO YOUR LETTERHEAD!

Rust-Oleum Corporation
2982 Oakton Street, Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer for rusted metal surfaces.
- ☐ Complete literature with applications and color charts.
- ☐ Information on matching special colors.
- ☐ Thirty-page report on Rust-Oleum fish oil penetration.

CLARAGE

Presenting new highs in quietness and dependable broad efficiency...

NEW DYNAFOIL heavy-duty FAN

featuring a perfected airfoil blade design

With this new Clarage Type AF Dynafoil Fan you get stable high efficiency where it counts—under actual operating conditions.

Ideally suited to mechanical draft and heavy-duty applications, such as industrial processes, conduit type air conditioning, and tunnel ventilation, this latest in the Clarage line of superior fan equipment is built in 13 sizes, Classes II, III, and IV construction.

WRITE FOR CATALOG 859 which provides outlined dimensions and description of new Clarage Type AF Dynafoil Fans. Or contact nearest office.

Dependable equipment for making air your servant

CLARAGE FAN COMPANY

Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 541 on Reply Card

Engineered Maintenance reduces supervisory time, building depreciation expense, and sanitary supply costs for Royal Packing Company

Engineered Maintenance keeps work surfaces spotless.

"Gives us far better organization and control of plant housekeeping"

"Puritan Engineered Maintenance has helped us achieve a higher sanitation level while actually saving money."

As a meat processor, Royal Packing Company, St. Louis, Missouri, always has been sanitation conscious. Yet the introduction of Puritan Chemical's new ENGINEERED MAINTENANCE techniques helped this leading meat producer save money in three important areas. "And," says Mr. Ben Gray, General Superintendent and Purchasing Agent, "the general improvement in plant housekeeping has made it easier to meet all government inspection standards."

Thoroughly tested in both Royal plants, ENGINEERED MAINTENANCE has relieved executives of the vexing and time-consuming little details of sanitary maintenance management. It has made supervisors' jobs easier by providing them with an organized plan and thoroughly trained help.

How Engineered Maintenance works

You receive a complete, individually planned program, based on a personal inspection of your plant, and prepared by professional engineers. The program is set up to meet the exact requirements of your company. Your custodians' work is organized. You are provided with a system of automatic controls. You are certain of continuing follow-through and review, not only by members of your organization, but by Puritan trained service representatives as well.

Why it is so important

In these days of increasing operating costs, more efficient sanitary maintenance is the logical way to protect your company's investment in plant, equipment, and higher pay scales. Management appreciates this . . . and ENGINEERED MAINTENANCE provides you with a new and tested solution, without requiring you to ask for a larger budget.

Engineered Maintenance available as a service—without charge to you!

Puritan will inspect your plant, review your present sanitary maintenance procedures, submit and help install an individually planned ENGINEERED MAINTENANCE Program for your company. As a user of Puritan Sanitary Maintenance products your receive this service free.

Puritan products are nationally used, competitively priced, fully guaranteed. You do not pay a premium of any kind for either your ENGINEERED MAINTENANCE Program or for any Puritan product. You are not involved in any long-term contract. The burden of proof is upon us.

New booklet gives more detailed explanation

Write for "ENGINEERED MAINTENANCE." This new technical brochure explains the Puritan program fully . . . shows how it will help your company . . . how it will save your time.

COPYRIGHT 1959 PURITAN CHEMICAL COMPANY

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For more facts circle 542 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Assembly Time Cut 50 Per Cent

ROTOR ASSEMBLY time has been cut more than 50 per cent at General Electric's Small Aircraft Engine Department at Lynn, Mass. Key to this reduction is a new balancing method developed by department engineers for use in the assembly of T58 turboshaft compressor rotors.

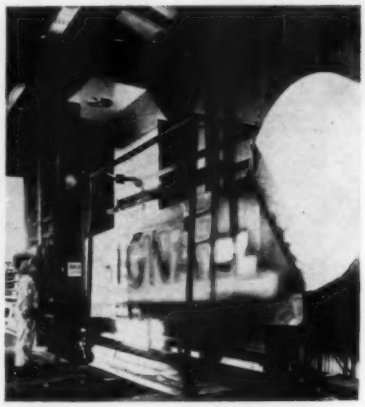
Miniature metal slugs make the new balancing technique possible; ten to fifteen slugs, weighing from 0.15 to 0.50 grams each, are usually needed to balance each rotor. Handled with tweezers, the slugs are placed beneath blade platforms in the circumferential dovetails of the compressor blades.

Explaining the critical necessity for extremely precise balance, engineers said that at the full rotor speed of 26,500 rpm, one gram off balance exerts 25 lb of force.

Prior to the introduction of the miniature slug method, the department was balancing rotors by a choice and substitution of blades. The exact weight of each blade had to be determined and if addition or subtraction of weight was required, a blade with the proper weight was substituted. There are more than 600 blades in the T58 rotor and the blades vary slightly but significantly in weight, making the balancing job both tedious and time consuming.

Paint Dryer Improves Work Flow

One major problem in the sign industry is finding enough shop space to store painted signs until they are dry. Heath and Company, Los Angeles, California, solved this problem by installing a vertical infrared oven to speed up drying and production. Within minutes after multi-color signs leave the infrared oven, they can be loaded on a truck for delivery or moved to the plant storage yard.



Continuous production of painted signs is made possible with infrared oven.

This speedup in drying time is particularly important since the company makes about 60 colors available to its customers and as many as 12 colors may be used on a single sign. Each color must be thoroughly dried before the next color is applied.

Prior to installing the infrared drying system, the paint room would be so crowded with signs still drying, that work flow was seriously hampered.

Initial cost of the new infrared oven, furnished by The Fostoria Pressed Steel Corporation, is estimated to be approximately one-third that of a conventional type oven. Operating costs are also quite modest, based on a capacity load of 60 kilowatts.

Double Upender Stacks Soft Bundles Five High With Ease

First upender receives loads, one at a time, and stands them up on second upender. When five loads have been accumulated the second upender, shown in the photograph, sets up the loads stacked five high. Units supplied by the Lamson Corporation, Syracuse, N. Y., are controlled by photoelectric eyes. System works very well with materials too soft to be handled with mechanical clamps.

Coil Conveyor Saves $18 an Hour

INSTALLATION of a powered inspection and packaging conveyor system for aluminum coiled sheet is saving Kaiser Aluminum & Chemical Corporation an estimated 18 dollars per operating hour. Part of the inspection and quality control program built into their new Ravenswood, West Virginia, integrated aluminum reduction and fabricating facility, the new conveyor system provides faster packaging of aluminum coiled sheets.

The new system eliminates up to

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE
STEEL SHELVING

quickest BECAUSE...

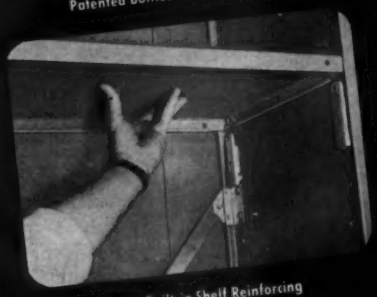
. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

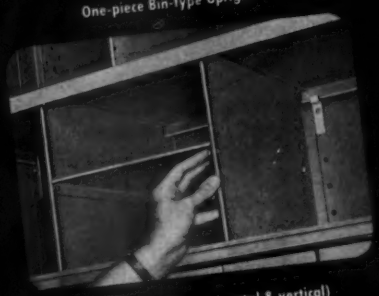
THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

Patented Boltless Shelf Bracket


Factory Built-in Shelf Reinforcing

One-piece Bin-type Upright


Snap-in Dividers (horizontal & vertical)

Clip-on Bin Fronts

Bottom Shelf Support and Floor Angle

DELUXE

DELUXE METAL FURNITURE COMPANY · Warren 7, Pa.

A Division of the Royal Metal Manufacturing Company

For more facts circle 543 on Reply Card

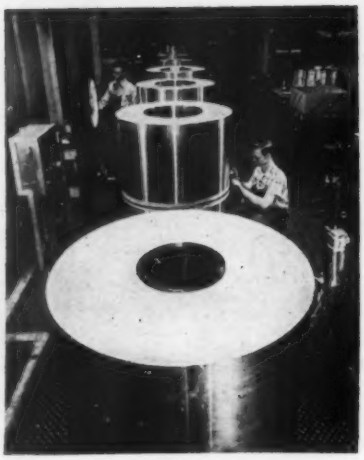
OPERATION — PRODUCTION

(O and P begins on page 58)

five delay points, reduces distances sheet and packaging materials travel by as much as 655 ft, cuts space required for inspection and packaging operation by more than 3600 sq ft and eliminates the use of at least one overhead crane and two power trucks formerly required.

Divided into two separate conveyors, the inspection conveyor is 123 ft long, and is powered by a 25-hp, 300 rpm d-c motor. With a rated capacity of 110,000 lb, the conveyor operates at a variable rate of speed up to 40 fpm.

Once on the conveyor, the metal moves along a 54-ft inspection area where a crew consisting of an inspector, assistant inspector, conveyor scale man and helper make the final inspection of the finished product. The conveyor is indexed so that it automatically stops every 54 or 72 inches. As the conveyor advances, a hydraulic lift elevates the coil one inch, placing it in the scales for an individual weight which is recorded for each coil.



Finished coils move down the inspection line to be checked and weighed.

When the coil reaches the end of the inspection conveyor, it is lifted by a 5-ton overhead crane directly onto package skids in position on the package conveyor. The packing conveyor is a gravity feed, roller conveyor built on a slight tilt so that skids of coiled sheet can be easily pushed along its 78-ft length.

Loaded skids are pushed along the packing conveyor line with wrapping, banding and marking operations performed as the coil moves down the line. After a final weight check, the packaged coil reaches the end of the conveyor where it is picked up by a truck and moved to the shipping area.

Designed by Kaiser Engineers and fabricated by the Standard Conveyor Company, St. Paul, Minnesota, the new inspection and packaging conveyor lines incorporated ideas and labor saving devices developed after several years of study by company engineers.

Motorized Filter Cleans Itself To Protect Oil Products

SELF-CLEANING filters assure better protection of products and reduce equipment maintenance at the Brooklyn refinery of the Socony Mobil Oil Company, Inc. The filters, equipped with stainless steel metal-edge elements, are installed in the lines of each of 18 filling stations to insure cleanliness of greases and lubricating oils as they flow into shipping drums.

Self-cleaning motorized filter, right, protects oil products at drum-filling line.

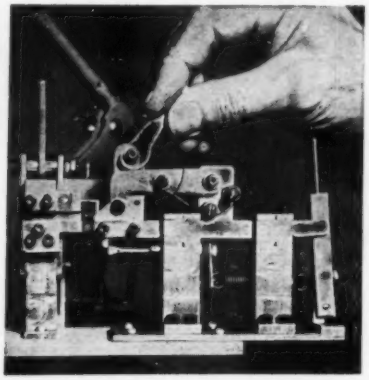
Filter presses formerly used had several stationary screens that had to be removed and washed for use with different greases and oils. This hand work has been largely eliminated by the installation of the self-cleaning filters supplied by Purolator Products, Inc.

Filters are cleaned by rotating the cylinder filter media against a stationary blade. Six of the filters are equipped with electric motors to provide fully automatic cleaning. Filtered particles drop down to the bottom of the filter case where they can be removed quickly.

How To Make Strong Wire Joints

A NEW SYSTEM for brazing solid and stranded copper wires has been developed by Maurice G. Steele, development engineer for Rome Cable Corporation, Rome, New York. A U. S. patent has been awarded to Mr. Steele and has been assigned to Rome Cable.

Two opposed mechanical metal clamps are used, one on each side of a standard carbon-block brazer using opposing electrodes. One, a fixed clamp, is separated from the electrode by a small air gap of approximately 1/64 in. The other is a spring action sliding clamp designed to move horizontally in line with the electrode groove and towards the other clamp.



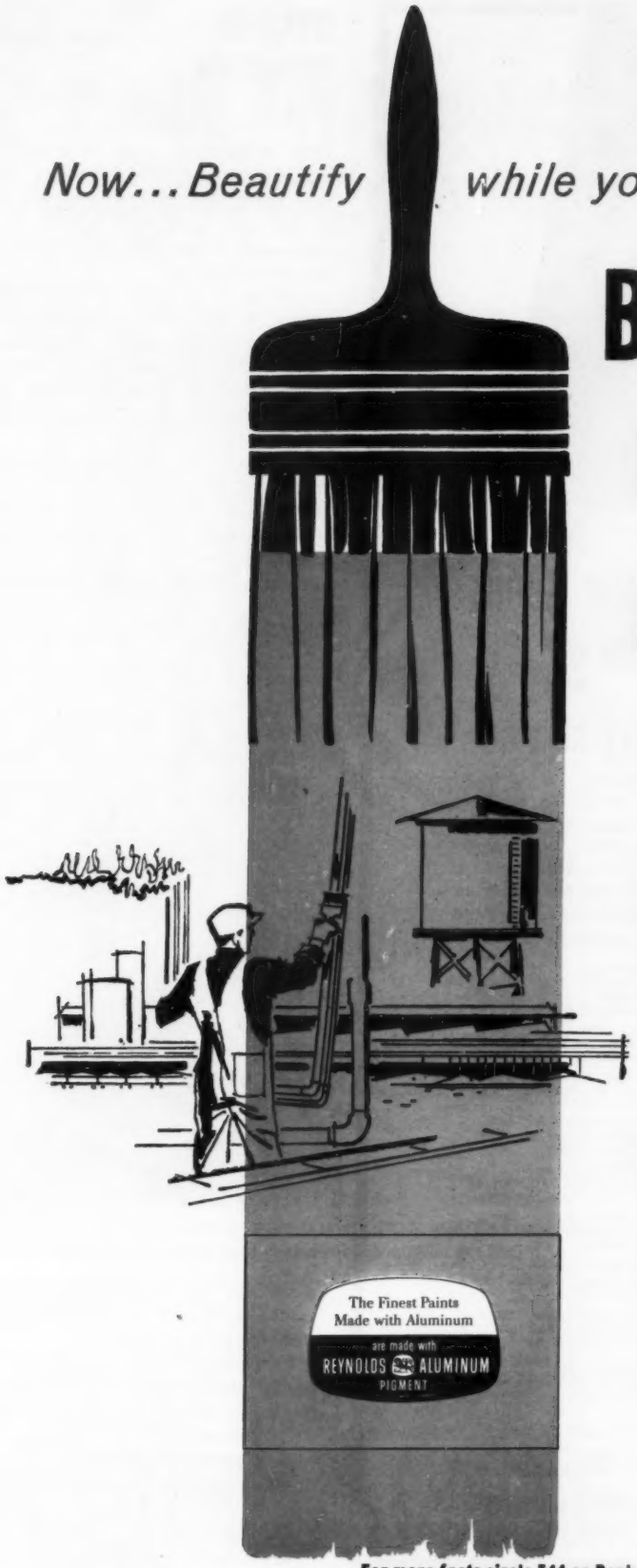
Opposed clamps are keys to system of brazing solid and stranded wires.

To braze, one wire is inserted in the fixed clamp so that the wire end extends nearly halfway through the groove in the adjacent lower electrode. A small pellet of brazing metal is placed in the groove adjacent to the wire end. The other wire is placed in the sliding clamp so it lies in the lower electrode with the end touching the opposite end of the brazing pellet. A stop device holds the clamp about 1/32 in. from the electrode.

Next, the upper electrode is low-

Now... Beautify while you protect with

BRUSH-ON COLORED ALUMINUM PAINTS



Dazzling new colored aluminum paints and roof coatings are now offered by leading paint manufacturers using Reynolds Aluminum Pigments. These coatings *decorate* roofs, fences, masonry, tanks, fixtures and machinery—and *protect* them with a tough aluminum "shield." These eye-appealing colored aluminum coatings don't have to be sprayed on... an ordinary paint brush will do the job.

The new colored aluminum paints still give you all the famous aluminum advantages: heat reflectivity, insulation, corrosion resistance and protection against rust. Yet these new paints are economical to use, and are available in formulations suitable for indoor and outdoor use.

Reynolds does not make paint, but does supply the finest aluminum pigments to leading paint manufacturers. For further information and names of manufacturers, write *Reynolds Metals Company, Box 2346-PL, Richmond 18, Virginia.*

See Reynolds TV show—
"WALT DISNEY PRESENTS"
every week on **ABC-TV**

For more facts circle 544 on Reply Card

ALL YOU WANT TO KNOW ABOUT

PUMPS

for corrosive and slurry service

Complete engineering data — dimensions, performance curves, parts lists and specifications on the entire Dorr-Oliver line of alloy metal, lined and diaphragm-type pumps — *all in one big bulletin!* Here's everything you need to solve difficult pumping problems . . . just off the press!

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OPERATION—PRODUCTION

(O and P begins on page 58)

ered to enclose both wire ends and the brazing pellet. Pressure on the sliding clamp is adjusted so it presses one wire end against the pellet and in turn, the pellet against the other wire end.

Current is applied and the spring action of the sliding clamp causes one wire end to move through the electrode groove towards the other wire end as the pellet is melted. A strong brazed joint is formed where the wire ends meet.

The new system makes stronger brazes than were possible previously and results in minimum length of stiffened wire, minimum annealed length and no distortion of wire shapes during the brazing operation.

Step Stool for Fast Relamping

Contributed by Kenneth M. Brady, Senior Supt. Bldgs. and Grounds, Medical Center, U.C.L.A.

MAINTAINING incandescent lighting fixtures in some 25 miles of corridors called for a lot of ladder work until our maintenance department developed a portable step stool to speed up this work.

Assembled from plywood, handy stool speeds up relamping of corridor fixtures.

Constructed of plywood, the handy unit furnishes the elevation needed to do this work effectively. The vertical handle provides a steady hand support when working on the top step. Drawers are built-in under the top two steps to provide space for storing spare lamps.

Two casters are mounted at the

Handle Any Adjustable-Speed Job with One of these Square D "packages"*

One of 13 CUSTOM DRIVES for an automotive plant for control of 6 miles of monorail conveyors

** a Square D "package" includes the power conversion unit, operator's station, and drive motor*

ELECTRONIC DRIVES

employ advanced designs using more static elements and less tubes. Fail-safe circuits prevent motor runaways. Available in sizes from 1/20 H.P. through 40 H.P.

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provide top reliability and simple maintenance. Save both floor space and weight as compared to conventional drives. Available in sizes through 400 H.P.

MOTOR-GENERATOR DRIVES

use static regulators and rectifiers for simplified maintenance. Rugged, heavy-duty components are provided in each drive. Available in sizes through 400 H.P.

CUSTOM DRIVES

for every possible adjustable-speed requirement can be designed for you using combinations of the above units, plus special units, with accuracies to fractions of 1%. The answer to your adjustable speed problem is as near as your Square D field office.

No matter what adjustable-speed requirements you may have, you can select a Square D drive to meet them exactly. Moreover, every component—from control to drive motor—is subjected to a complete electrical test, and the entire drive is test-run at the factory to assure top performance on the job.

***Write** for complete details. Ask for Adjustable-Speed Bulletin. Square D Company, 4041 North Richards St., Milwaukee 12, Wis.*

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

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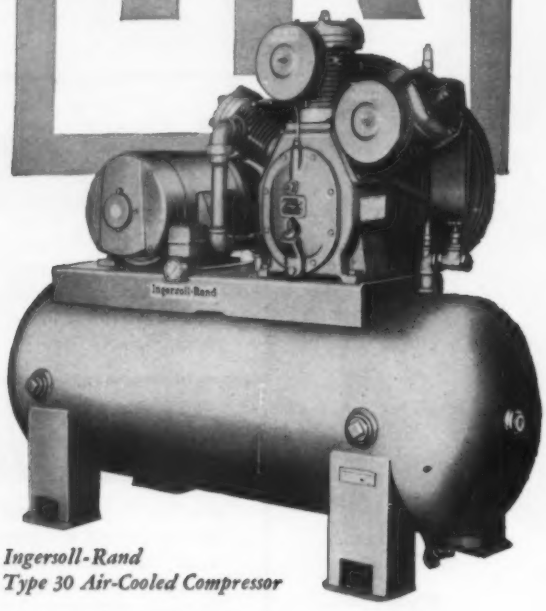
eliminate costly down time



Ingersoll-Rand
Type 30 Air-Cooled Compressor

Ingersoll-Rand Type 30 air-cooled, air compressors have shown, time and again, that you can install and forget them except for periodic checks. Rugged construction and special design features give these compressors outstanding durability that never lets you down. Exclusive features pioneered by Ingersoll-Rand and proven through years of performance add economical operation — more air per horsepower.

I-R Type 30 Compressors are available from ½ through 20 hp; bare, baseplate or receiver mounted. Write for detailed information.

Ingersoll-Rand

3-804 11 Broadway, New York 4, N. Y.

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OPERATION—PRODUCTION

(O and P begins on page 58)

front edge of the step stool and just clear the ground when the stool is set flat on the floor. Pulling on the handle brings the casters into play to assist moving the lightweight unit to the next position.

Tire Gage Checks Water Pressure

Contributed by H. Josephs, Maintenance Supervisor, Sun Shipbuilding Co., Chester, Pa.

WHEN PRESSURES fall in water lines around our plant, the fastest way to find the trouble is to check the pressure at various outlets on the affected line. A sudden drop in pressure at any point indicates some obstruction to the flow of water. Frequently, replacement of a single rusted fitting will restore normal pressure.

These pressure checks are made with a standard automobile tire pressure gage costing less than $1.00. The cone-shaped outlet fits into various faucet openings and pipe ends and soon locates the trouble. Dry the gage after each use and make several checks until you become familiar with the use of this low-cost gage.

Slippery Ramp Made Safe

Contributed by Kenneth F. Biddle, Plant Engineer, Sundstrand Aviation, Rockford, Illinois

TWO ADJACENT areas of our plant have a floor differential of about eight inches. The tile floor on the

Abrasive strips, cemented to the floor, provide safe sure footing on this ramp.

New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

●Now, for the first time on any electric hoist, you can have safe, sure mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is so simple in design and operation that it is guaranteed to give dependable, trouble-free protection during the entire life of the hoist. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

WRIGHT HOISTS

Wright Hoist Division · American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

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CHAMPION LAMP WORKS, Lynn, Massachusetts

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OPERATION—PRODUCTION

(O and P begins on page 58)

ramp connecting them was slippery and hazardous. After several falls and numerous experiments with non-skid floor finishes, we found a solution.

At about four-inch intervals, we cemented ¾-in. x 24-in. Safety-Grip strips to the floor. The abrasive surface supplies sure footing and has reduced the possibility of accidents. The strips have withstood cleaning and have an attractive appearance.

Trough Simplifies Cable Changes

CAREFUL PLANNING has greatly simplified problems of plant expansion for Jack Davis, Plant Engineer at Container Corporation's Valley

Elbow fitting was replaced with this "Tee" fitting so that new cables could be run to a new location. Trough supports both new and old cables and leaves room for additional capacity.

Forge plant. Capacity for new circuits was provided when cable trough was installed to support the original cables. New circuits can now be added without cost for new cable supports.

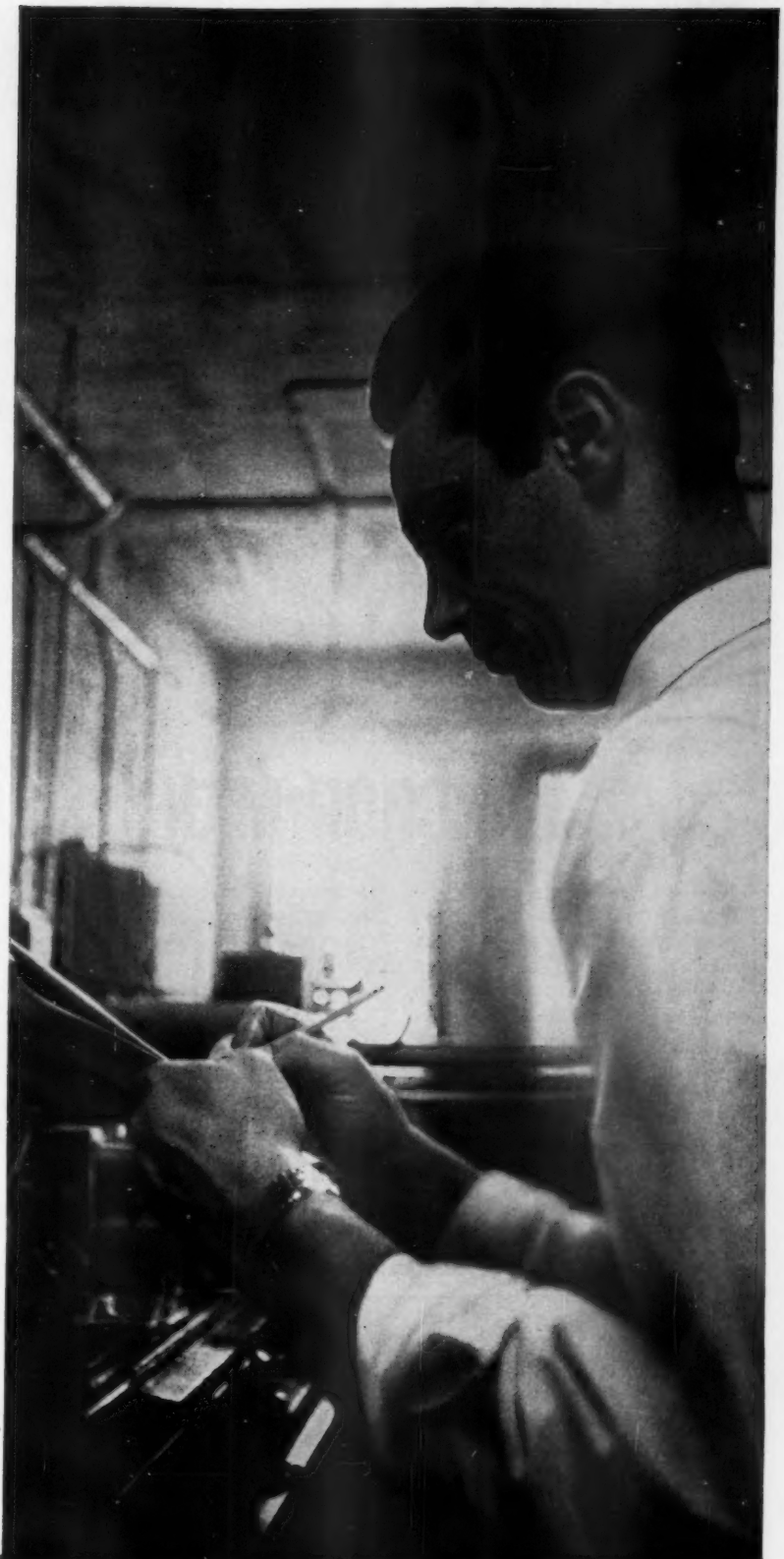
Originally, only the warehouse circuits were supported in trough and one right angle run close to the ceiling held them all. When additional power was needed in a different location, the standard 90 degree elbow fitting was replaced with a "Tee" and a new section of six inch wide trough carried the

HERE'S HOW ESSO RESEARCH CAN GO TO WORK FOR YOU

The Esso Lubrication Engineer brings to your shop the vast experience and facilities of Esso laboratories and research—as a customer service.

He offers, with a broad knowledge of fuels and lubricants, considerable experience in the maintenance of equipment like yours. For instance, he can trouble-shoot cases of rapid wear and frequent overhauls... point out instances where too much lubrication is wasteful... where too little—or the wrong kind—results in unnecessary wear. And if you have an unusual problem, he can have it analyzed in one of the conveniently located Esso Sales Service Laboratories—capable of running over 500 different kinds of petroleum product tests.

Let an Esso Lubrication Engineer help *you* cut maintenance costs. For more information, contact your nearest Esso office, or write to: Esso Standard Oil Company, 15 West 51st Street, New York 19, N.Y.



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OPERATION—PRODUCTION

(O and P begins on page 58)

new circuits. Trough and fittings used in this system were supplied by the T. J. Cope Division of the Rome Cable Corporation.

Air Locates Buried Water Leaks

Contributed by H. Muller, Maintenance Foreman, Budd Mfg. Co., Philadelphia, Pa.

WE HAVE several long underground water lines around our plant using both metal and plastic pipe. In the event of a leak, water may not show above ground at the exact point of the leak, and we frequently have to do a lot of digging to locate the break.

This digging has been reduced to a minimum by using compressed air to accurately pinpoint a break in the line. When a leak is suspected, the faulty line is capped at each end. One of the caps is equipped with a valve taken from an auto tire which simplifies connecting the air compressor to the suspected line.

With the line pressurized, we walk along the route of the buried pipe until we hear a bubbling sound. This locates the break and reduces the need for lengthy trenches formerly required to spot water leaks.

Chemical Improves Hand Filing

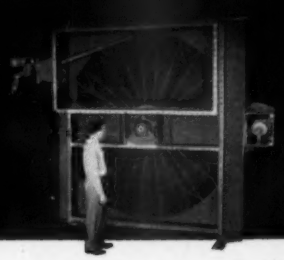
EFFICIENCY of hand filing depends largely on the degree to which the file teeth become clogged with metal. Recent experiments have shown that if files are treated with a dispersion of colloidal molybdenum disulphide in alcohol, cutting efficiency can be increased by as much as 60 per cent. The chemical, manufactured by Acheson Colloids Company, Port Huron, Mich., acts as a kind of parting agent to keep the file teeth clean.

In the test procedure, each file face was rubbed 30,000 times at 55 strokes per minute under a pressure of 31 psi. The test bar was one inch square with a Brinnell hardness of 187. Metal removed from the test bar determined file efficiency under both standard filing conditions and using the chemical parting agent. The use of this chemical is recommended for fine cut files.

HERE'S WHAT YOU CAN DO ABOUT THE HIGH COST OF FUEL

GET MORE HEAT FROM EVERY FUEL DOLLAR WITH A

Ljungstrom® Package Air Preheater



By recovering heat from the exhaust gas, the Ljungstrom Air Preheater can increase combustion temperature as much as 400° or more! By raising furnace temperature this way, you permit more heat to be absorbed into boiler tubes or heat transfer surfaces. The results are increased capacity and greater output from every fuel dollar you spend.

And when you credit fuel savings, the installed cost of a Package Ljungstrom can be paid for in approximately two years.

You get maximum heat recovery because the Ljungstrom's exclusive rotary heat transfer element puts the heat back directly into the combustion air, i.e. without passing it through heat-absorbing partitions or tube walls. Package design also gives you all the advantages and economies of the Ljungstrom in a compact, pre-assembled unit. Available in vertical or horizontal models, Package Ljungstroms are readily adaptable to any plant arrangement.

For further information, write today for the free 14-page Package Ljungstrom manual.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

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Panelboard planning helps Power-Up The National Cash Register Plant

Owner: The National Cash Register Co., Dayton, Ohio
Architects: Lorenz and Williams, Architects and Engineers, Dayton, Ohio
Consulting Engineer: Schweiger, Heapy & Associates, Dayton, Ohio
General Contractor: Streeter Associates, Inc., Elmira, N. Y.
Electrical Contractor: Buffalo Electric Co., Inc., Buffalo, N. Y.
Westinghouse Distributor: Buffalo Electric Co., Inc., Buffalo, N. Y.

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An all-Westinghouse electrical distribution system meets all requirements

The new Adding Machine Division Plant of The National Cash Register Company in Ithaca, New York, was carefully planned to provide for efficient production and future plant expansion. Completely Westinghouse equipped, this new plant has a 50% reserve electrical capacity that can be utilized readily with the spare equipment now installed.

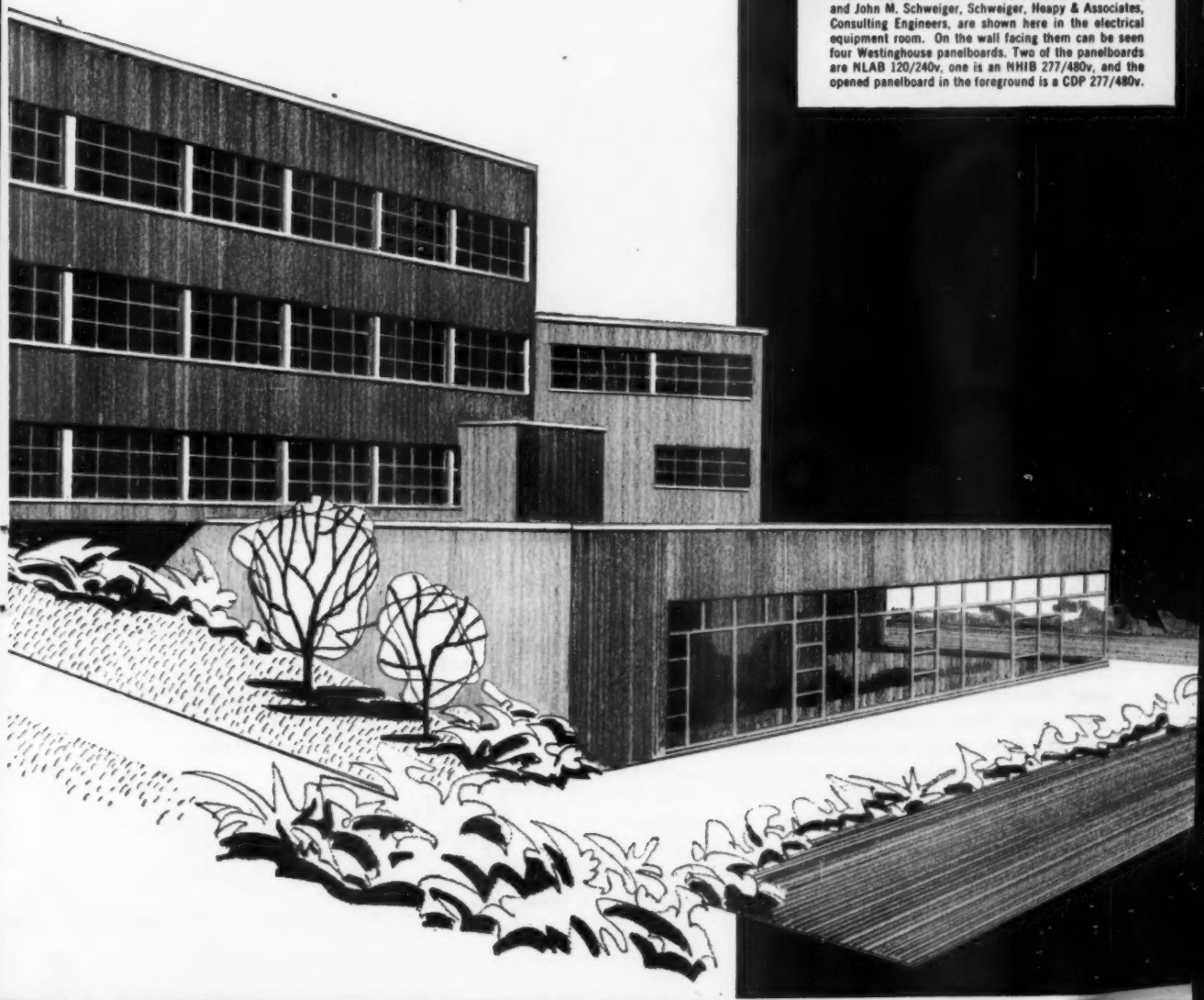
Westinghouse works closely with you in planning for future and present electrical needs, and in providing flexible and efficient systems that can be adapted to any changes in your production methods. Find out how Westinghouse Power-Up planning can increase the efficiency of your installation. Contact your nearby Westinghouse office, or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-93549

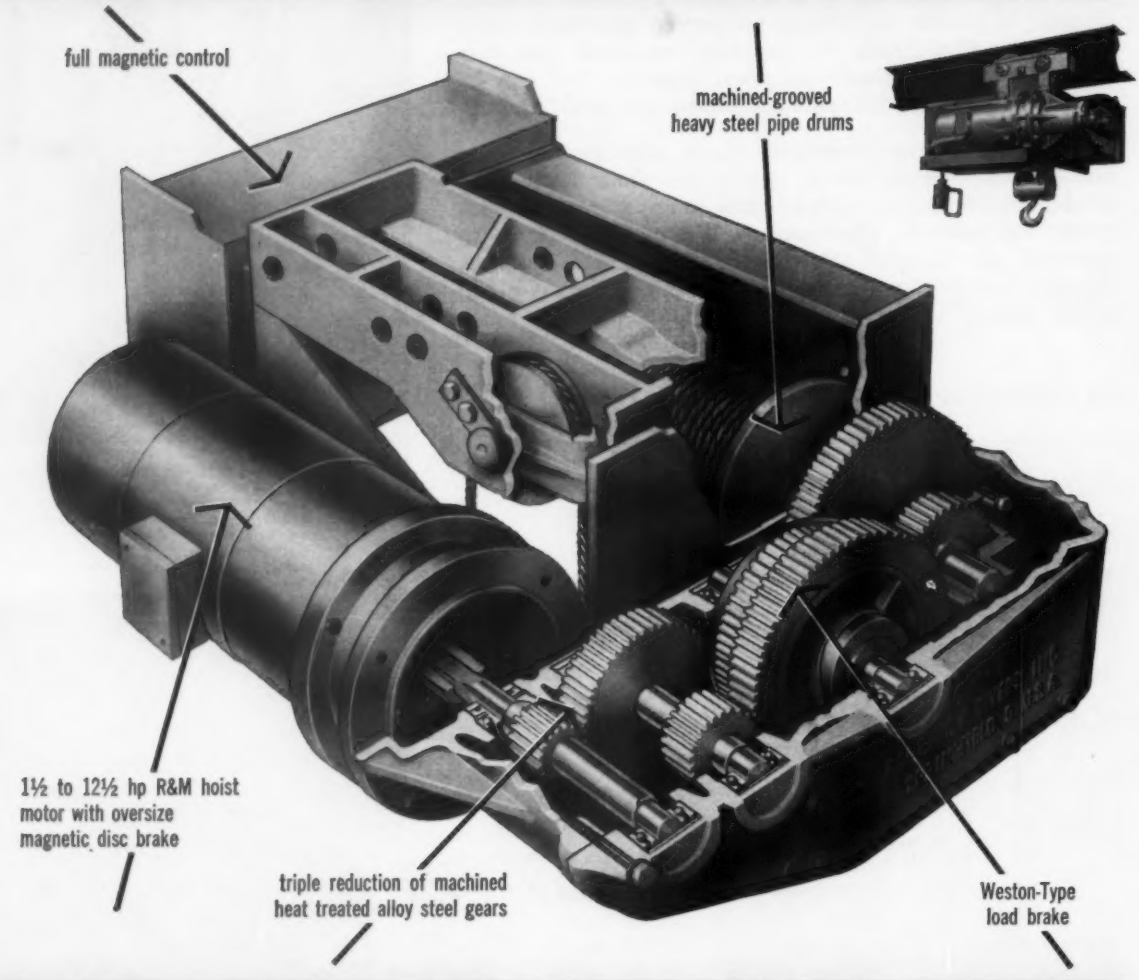
YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Clair Dean, Buffalo Electric Co., Electrical Contractors, and John M. Schweiger, Schweiger, Heapy & Associates, Consulting Engineers, are shown here in the electrical equipment room. On the wall facing them can be seen four Westinghouse panelboards. Two of the panelboards are NLAB 120/240v, one is an NHIB 277/480v, and the opened panelboard in the foreground is a CDP 277/480v.



big hoist value


full magnetic control
machined-grooved heavy steel pipe drums
1½ to 12½ hp R&M hoist motor with oversize magnetic disc brake
triple reduction of machined heat treated alloy steel gears
Weston-Type load brake

R&M Type F standard low-headroom hoists excel in the heaviest, most severe service. Frame is solidly braced welded steel. Special weather and dustproof R&M hoist motor runs cool, has the highest time rating found in any standard hoist—30 min., 55° C. rise. And the oversize magnetic disc type motor brake requires virtually no adjustment. Full magnetic control with reduced push-button voltage is standard. With lug mounting, Type F-2 headroom is only 16½" in 2 ton capacity.

Capacities: ½ to 10 tons. Speeds: 10 to 54 fpm. Lug mounting; push, hand geared or motorized trolleys.

Robbins & Myers, Inc., Hoist & Crane Div., Springfield, O.

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Request Bulletin 801-C today

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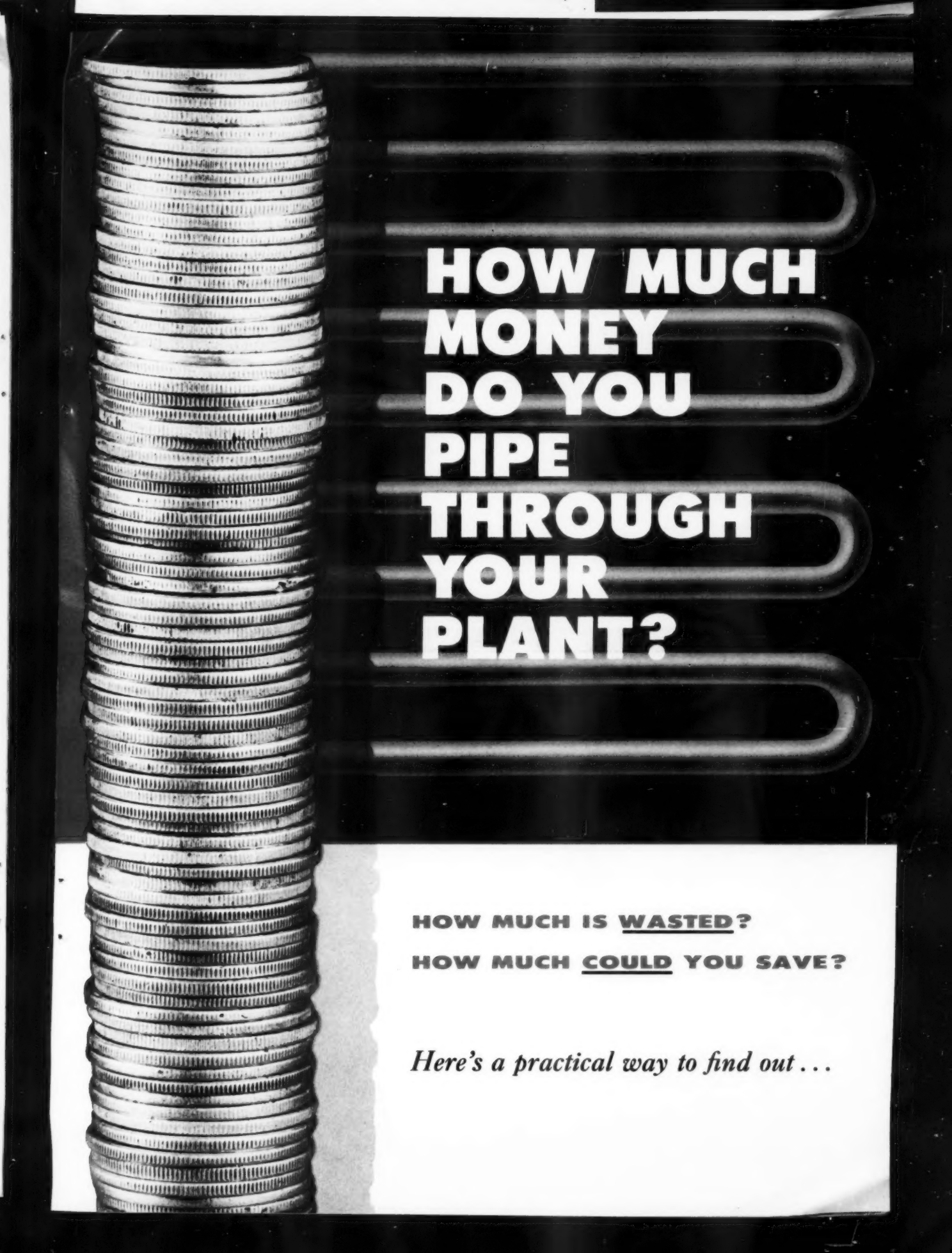

HOW MUCH MONEY DO YOU PIPE THROUGH YOUR PLANT?
HOW MUCH IS WASTED?
HOW MUCH COULD YOU SAVE?
Here's a practical way to find out . . .

How modern measurement and control methods can help you save materials, time, and money

How long could a supermarket survive without modern cash registers and check-out methods to measure and control the flow of merchandise —the flow of money? The same sound business logic is being applied in more and more manufacturing and process plants in the competitive struggle to keep costs down and quality up.

Applying modern methods of measuring and controlling the money that flows through pipes in *your* plant (in the form of gases or liquids used as fuel, as raw materials, or as aids in manufacturing) makes sense for one basic reason: *It pays.*

"In-plant" metering, for instance, pays for itself quickly in better cost control, in maintaining quality, in replacing slow and expensive batching methods, and in providing dependable audit control records.

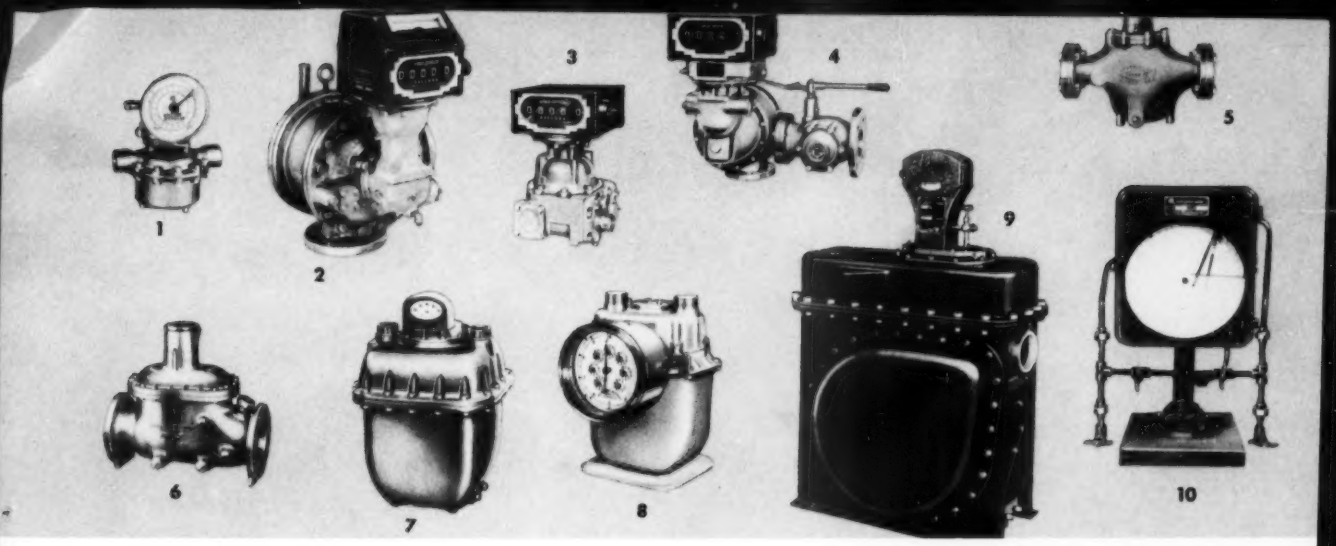
Gas pressure regulators are being used in hundreds of plants where they were never used before to insure more efficient, more economical use of both natural and "bottled" gas.

Better valves and valving methods pay for themselves through reducing waste, down time, and flow contamination.

There is hardly a plant of any kind—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved.

Certainly it's worth investigating—especially since it will cost you nothing to talk to a Rockwell Field Engineer. He represents the most complete and versatile line of measurement and control products available through any one source, and a wealth of practical know-how in modern measurement and control methods. To have a Rockwell Engineer visit you or for literature on Rockwell Meters, Valves and Regulators, send the coupon on the back page.

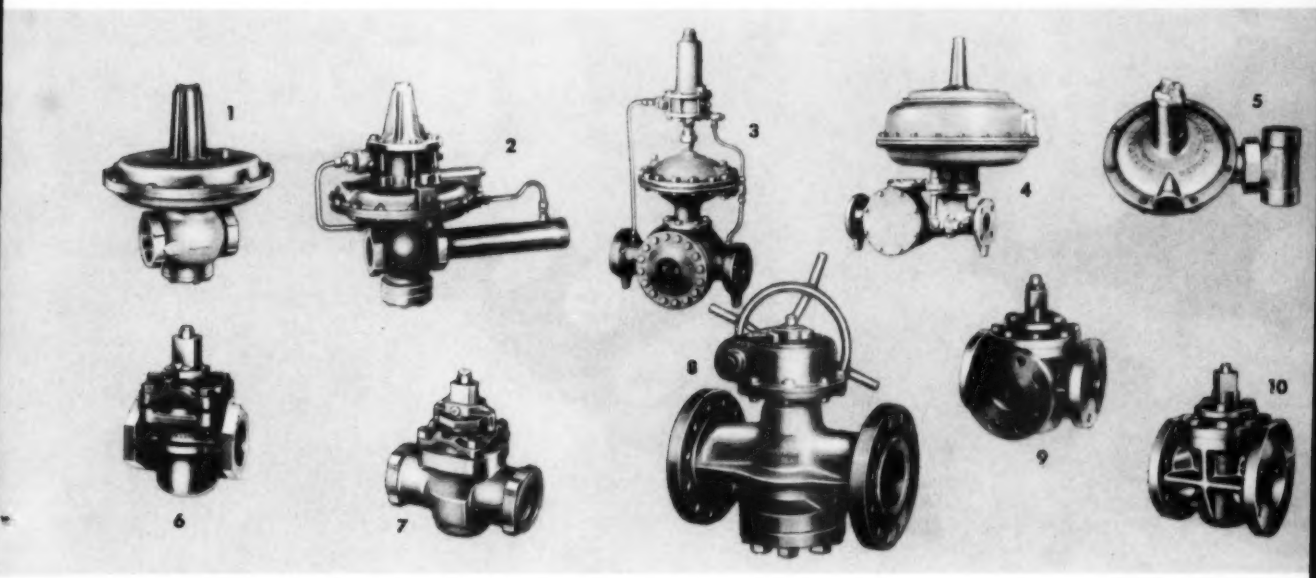
ROCKWELL IS THE LEADING SINGLE SOURCE FOR



"In-Plant" Metering: Liquid meters and gas meters are the "cash registers" of modern plants, vital in keeping costs down and quality up. Shown here are just a few of the hundreds of Rockwell liquid meters and gas meters. There is a Rockwell meter to measure accurately and economically just about anything that will flow through a pipe.

Rockwell Liquid Meters: (1) Oscillating piston meters . . . (2) Rotary displacement meters . . . (3) Reciprocating piston meters . . . (4) Meters with automatic quantity control valves . . . (5) Hot water meters . . . (6) Large capacity water meters.

Gas Meters: (7) Large capacity aluminum meters . . . (8) Consumption test meters . . . (9) Large capacity pressed steel meters . . . (10) Orifice meters.



Controlling Piped Material:

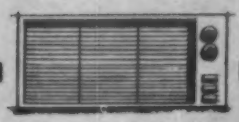
Better control of piped material (liquids, gases, and slurries) pays for itself quickly by preventing waste, assuring better utilization, and increasing safety. Here are a few of the Rockwell-Nordstrom lubricated plug valves and Rockwell gas pressure regulators that can improve piped materials handling in hundreds of different ways.

Rockwell Gas Pressure Regulators: (1) Furnace and boiler regulators . . . (2) Kiln and oven control regulators . . . (3) High pressure reduction regulators . . . (4) Low pressure burner regulators . . . (5) Service regulators.

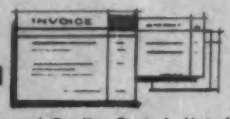
Rockwell-Nordstrom Lubricated Plug Valves: (6) Semi-steel valves . . . (7) Steel valves . . . (8) Hypresphere valves . . . (9) Multiport® 3- and 4-way valves . . . (10) Corrosion resisting valves in various alloys.

MEASUREMENT AND CONTROL PRODUCTS AND IDEAS . . .

See where modern measurement and control can help you cut costs and improve production



Air Conditioning: Rockwell-Nordstrom valves insure proper balancing on chill water lines; gas meters disclose efficient or inefficient use of fuel; regulators control economical gas flow.

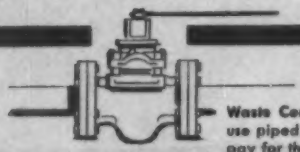


Cost and Quality Control: Metering can often replace expensive batching methods, with worthwhile savings in time, space, and labor, and more dependable control of quality.

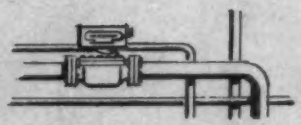
Tax Control: Where sewage taxes are based on water consumption, you can make substantial tax savings by metering water which does *not* go out through the sewage system (used in your finished product, or to water plant grounds, etc.).

Audit Control: Gas and liquid meters are accounting machines for anything that flows through pipe; meter records provide accurate data for better cost and audit control.

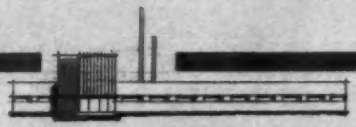
Plant Protection: Rockwell-Nordstrom valves and Rockwell pressure regulators are safety devices; they prevent leakage of volatiles and caustics and maintain safe pressure limits.



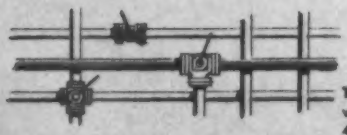
Waste Control: Where multiple units use piped material, individual meters pay for themselves by spotting inefficiencies. Rockwell-Nordstrom valves stop waste of volatile or hard-to-hold piped materials.



Production Planning: Using meters on gas and liquid lines throughout pilot plants provides invaluable information on efficiency of methods, equipment and design.



Plant Design: The best way to get full advantage of the savings made possible by modern measurement and control methods is to design these methods into your new plant or plant addition. Your Rockwell Field Engineer can help you.



Traffic Control: Rockwell-Nordstrom valves (including exclusive 3-way and 4-way Multiport designs) can give you profitably flexible routing of piped materials; often making possible the use of a single piping system for several different materials.

MAIL THIS COUPON TODAY . . . IT COSTS NOTHING TO FIND OUT HOW MODERN MEASUREMENT AND CONTROL METHODS CAN SAVE MONEY IN YOUR PLANT

Rockwell Manufacturing Company, Pittsburgh 8, Pa.

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I am concerned primarily with ☐ Light & Heavy Metal Fabricating ☐ Basic Chemical Production ☐ Chemical Processing ☐ Food, Drugs & Tobacco ☐ General Manufacturing Operations ☐ Petroleum Processing ☐ Others:_____

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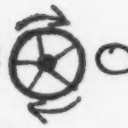
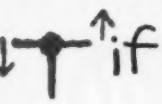
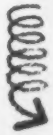
If it rolls on an axle  or turns in a bearing or rides on a shaft if it slides in a groove or moves on a pivot  if it bores  or cuts or transmits pressure one of Sinclair's 500 specialized lubricants is designed to make it work better. For answers to your lubrication problems, write today to

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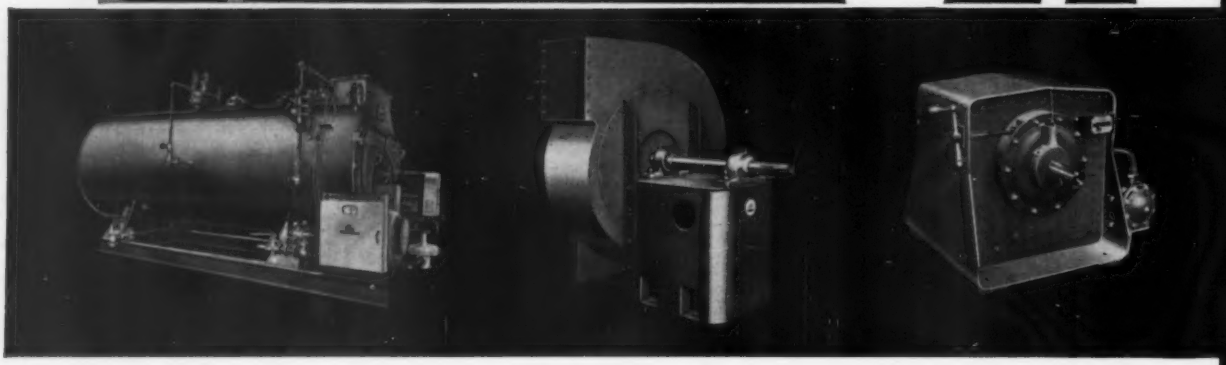

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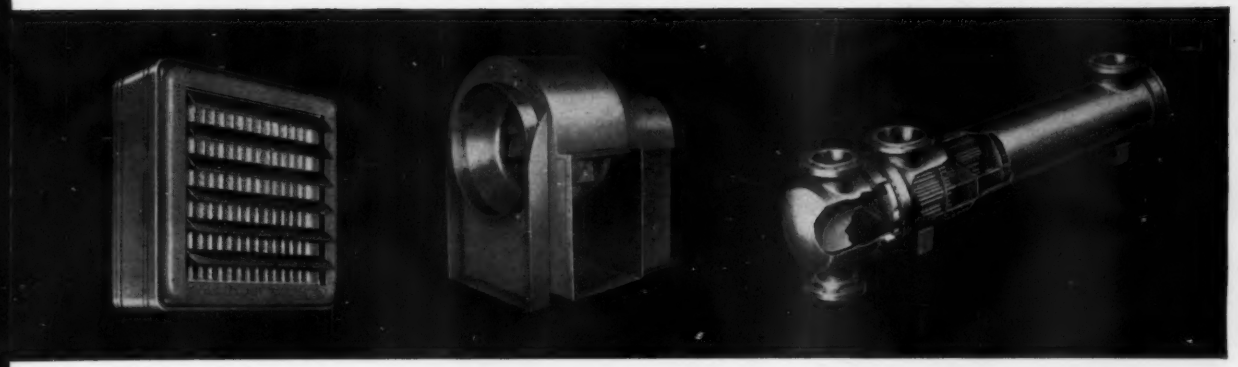

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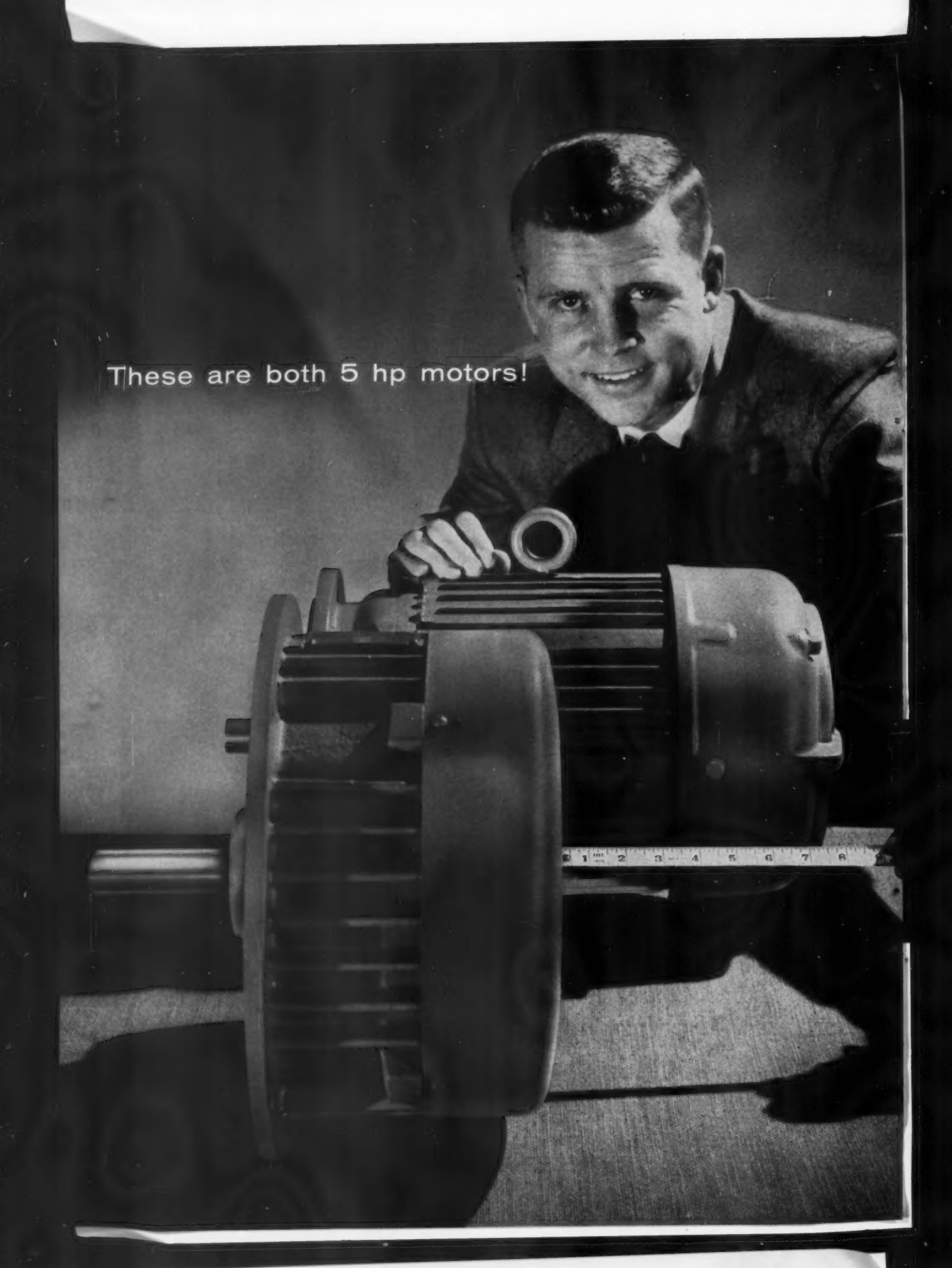
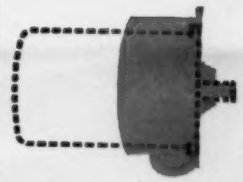

These are both 5 hp motors!



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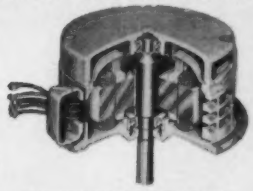

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New-product news from Louis Allis

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CONSTRUCTION BRIEFS

—a review of fundamentals for the plant engineer

Prepared by B. A. Wasil, Structural Engineer

DESIGN OF CONCRETE FOOTINGS PART I

ALL LOADS on stationary structures transfer from slab to beams into columns and walls, accumulating from floor to floor and eventually are transmitted into the ground. The footing is the means of spreading a high concentration of load of a column or wall over a larger area of ground, to bring the soil pressure within an allowable bearing value.

Figure 1 shows several types of footings. The wall footing is either reinforced or plain concrete. Where the wall loads and soil bearing value are such that a relatively small footing is necessary; then a plain concrete footing is ordinarily used. The individual column footing is two-way reinforced and is most efficiently square in shape.

Where there is a limitation in the width of footing in one direction, such as interference with other foundations, then the footing may be made rectangular in shape. If there is a limit in extension of a footing rather close to the column, combined footings are often used. When the exterior column has a lesser load than the interior column, a rectangular footing as shown may be used. However,

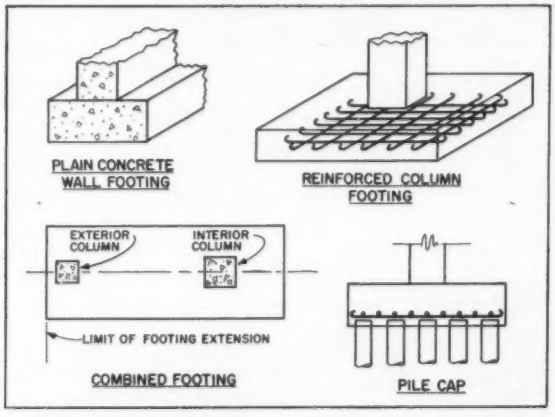


Fig. 1. Examples of footing construction: plain, reinforced.

if the exterior column has a greater load than the interior columns, a trapezoidal-shaped combined footing is ordinarily used.

Where the soil bearing value is low and/or the column loads very heavy (requiring a total area under footings more than one-half the area under the structure, consideration should be given to the use of a pile foundation or a mat under the entire structure.

Bearing value. The bearing value used in the design of footings will depend on the nature of the soil, the amount of water in the soil, whether the bottom of the foundation is above or below the water table, the nature of the soil for a reasonable distance below the bottom of the footing, and the settlement tolerance. A general soil classification for bearing values cannot take all these variables into account.

All other things being equal, soils of the same description may vary widely in their bearing values. If just the nature of the soil upon which the footing rests is considered, then within geographical areas, bearing values may be generalized. This is done for local building codes; Table I shows such values for Chicago.

It cannot be emphasized enough that many of the failures that occur on structures are primarily created by footing failure or settlement. Most of these failures are due to improper and incomplete evaluation of the soil conditions.

It is strongly recommended that a foundation engineer be consulted prior to the structural design of any structure. By means of soil borings to adequate depths, field

Table I. Bearing values of soil typical of Chicago area.

Material	Kips per sq ft
Solid rock	200.0
Hard pan	12.0
Gravel	6.0
Clay - hard	6.0
Clay - very tough	4.5
Clay - tough	3.5
Clay - stiff	2.5
Clay - soft	1.5
Clay - very soft	0.5
Inorganic silt - compact	2.5
Sand - compact, clean	5.0
Sand - silty, compact	3.0
Filled ground or loam	0.5
Organic soil	0.0

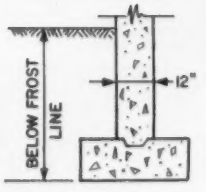
and laboratory tests on soils, the foundation engineer may propose the most economical site, type of foundation, elevation of bottom of footing, bearing value, estimated settlement, as well as pinpoint and correct any soil problems that may occur.

Minimum depth of footing. Because of frost heave, the bottom of the footing should always be located below the frost line. Depths of frost penetrations in the United States are readily available for reference; however, generalized information should be used only as a guide. Local experience and requirements should govern.

Structural design of footings. The design of footings will follow the requirements of the American Concrete Institute Building Code for 1956. The procedures will be pointed out step by step as they appear in the examples to follow.

Design of a Non-Reinforced Wall Footing

Governing Data



Wall Load: 12 kips/ft of wall
(This includes weight of wall but not weight of footing)
Bearing Value: $f_b = 4$ kips/sq ft

Allowable Concrete Stresses:
$f'_c = 2500$ psi
f_t = allowable concrete in tension = $.03\ f'_c = 75$ psi
v_a = average shearing stress = $.02\ f'_c = 50$ psi

Design

1. Width of Footing

Assume depth of footing is 18 in.

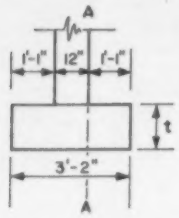
Thus the weight of footing $= \frac{18}{12} \times 150 = 225$ lb/sq ft

The net bearing pressure then $= 4000 - 225 = 3775$ lb/sq ft

Footing width $= \frac{12{,}000}{3775} = 3.18$ ft.

Use 3 ft, 2 in. footing width.

2. Moment and depth for moment



The bearing pressure acts upward at 3780 psf. Critical moment is taken about A-A, for a one-foot width of wall.

Thus $M = \frac{3780 \times 1.08^2}{2}$

$= 2200$ ft-lb

In order for the tensile stress of concrete not to exceed f_t. then, $\frac{I}{c} = \frac{M}{f_t}$, or $\frac{12t^3}{12 \times \frac{t}{2}} = \frac{2200 \times 12}{75}$

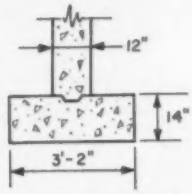
$t^2 = 176$; $t = 13.3$ in.

Use 14 in.

3. Shear and Check for shear

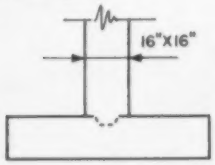
The critical shearing plane is taken at a distance equal to t, away from the face of the wall. This occurs outside the footing and thus there is no shear.

4. Sketch



Design of a Square Column Footing

Governing Data



Column Load: 245 kips (This includes weight of column, but not weight of footing)
Bearing Value: $f_b = 3$ kips/sq ft

Allowable stresses		*Design Constants*	
f_s =	20,000 psi	k =	0.403
f'_c =	3,000 psi	j =	0.866
f_c =	1,350 psi	R =	236
v_c =	75 psi	n =	10
u =	240 psi		

Design

1. Size of Footing

Assume total depth of footing is 24 in. Then, the weight of the footing is $\frac{24}{12} \times 150 = 300$ lb/sq ft. The net bearing pressure then is $3000 - 300 = 2700$ lb/sq ft.

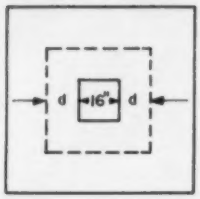
Footing area $= \frac{245{,}000}{2700} = 90.8$ sq ft

Side of footing $= s = \sqrt{90.8} = 9.52$ ft

Use footing 9 ft, 6 in. by 9 ft, 6 in.

2. Shear and depth for shear

Shear ordinarily governs the depth of two-way footings and is thus studied first.



The critical shearing plane is taken about a rectangle, a distance of the effective depth away from the column. The solution of shear and depth for shear is best accomplished by a trial and error method.

Trial No. 1. Let d = 20 in.

$V = 245{,}000 - \frac{[16+2\times20]^2}{144} \times 2700 = 186{,}200$ lb

$v = \frac{V}{bjd} = \frac{186{,}200}{4[16+2\times20]0.866\times20} = 48$ psi < 75 psi

This is satisfactory, but too deep.

Trial No. 2. Let d = 17 in.

$V = 245{,}000 - \frac{[16+2\times17]^2}{144} \times 2700 = 198{,}000$ lb

$v = \frac{198{,}000}{4[16+2\times17]0.866\times17} = 67.6$ psi < 75 psi

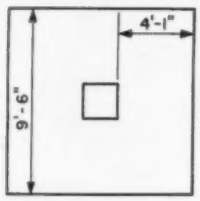
Trial No. 3. Let d = 16 in.

$V = 245{,}000 - \frac{[16+2\times16]^2}{144} \times 2700 = 201{,}800$ lb

$v = \frac{201{,}800}{4[16+2\times16]0.866\times16} = 75.8$ psi > 75 psi

Therefore use Solution No. 2; d = 17 in.

3. Moment and check of depth for moment



$M = \frac{2700 \times 9.5 \times 4.08^2}{2}$

$= 213{,}000$ ft-lb

$bd^2 = \frac{M}{R}$

$12 \times 9.5\, d^2 = \frac{213{,}000 \times 12}{236}$

$d = 9.75$ in. < 17 in.; OK

4. Steel requirements. The code allows a reduction to 85 per cent of the moment for two-way footings.

$$A_s = \frac{M}{f_s jd} = \frac{213{,}000 \times 12 \times .85}{20{,}000 \times .866 \times 17} = 7.4 \text{ sq in.}$$

5. Bond requirements. Again, 85 per cent of the shear may be taken for two-way footing. The shear is determined about the same critical plane as for moment.

$V = 2700 \times 4.08 \times 9.5 = 104{,}900$ lb

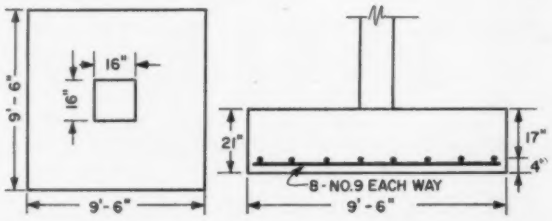
$$\Sigma_o = \frac{V}{ujd} = \frac{104{,}900 \times .85}{240 \times .866 \times 17} = 25.2 \text{ in.}$$

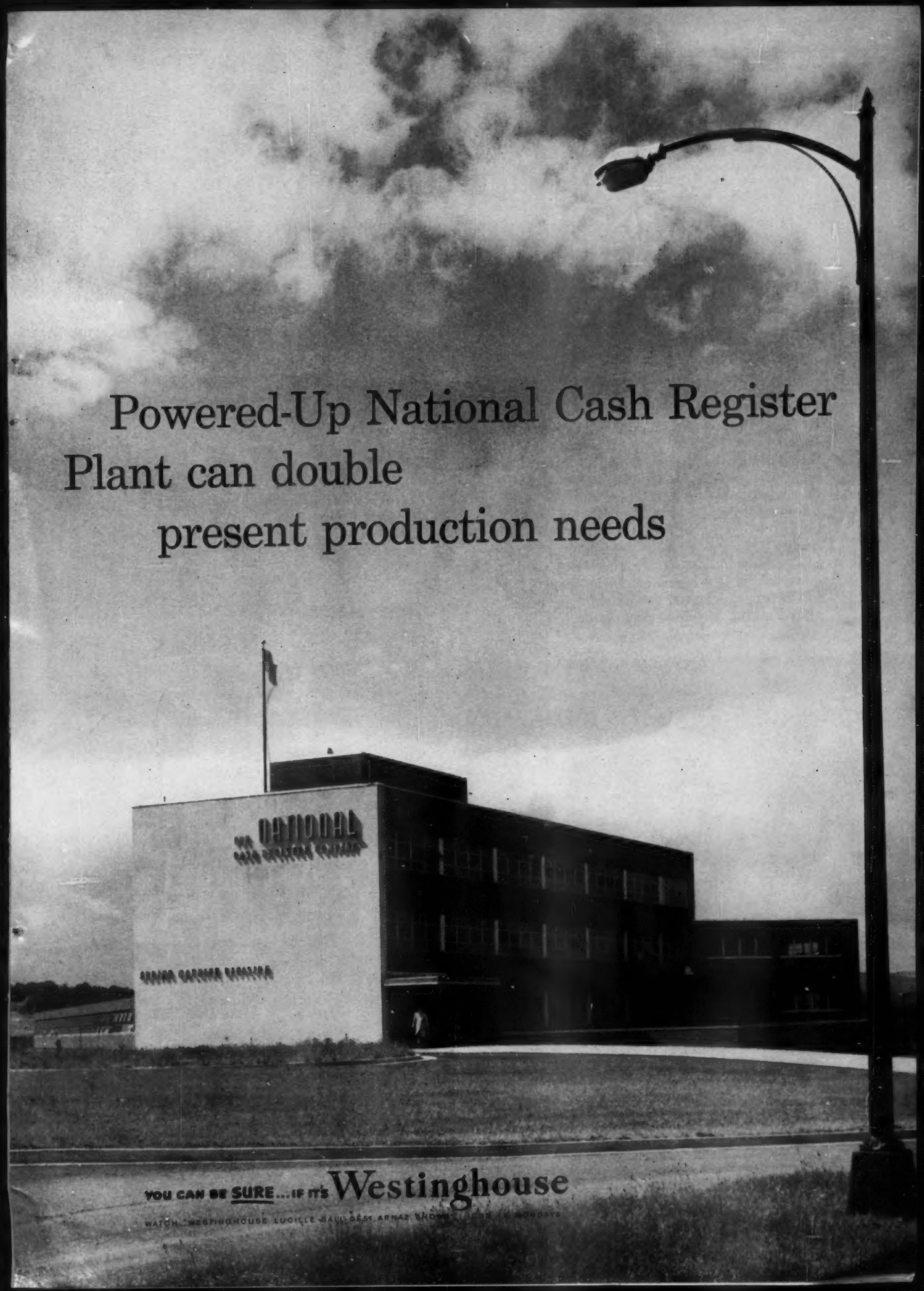
Use eight No. 9 bars.

$A_s = 8.00$ sq in.

$\Sigma_o = 28.4$ in.

6. Sketch




Powered-Up National Cash Register
Plant can double
present production needs
YOU CAN BE SURE...IF IT'S Westinghouse

Cover photo — Top: New National Cash Register Co. Adding Machine Division Plant, in Ithaca, New York. Westinghouse Type OV-20 outdoor lighting is used for the building approach and parking area.

New adding machine plant has 50% reserve electrical capacity

When the Ithaca, N. Y., Adding Machine Division of The National Cash Register Co. found its existing plant inadequate, a new plant site was secured. The design and planning for the new plant provided more efficient production methods and future plant expansion as required.

Once space requirements were satisfied, electrical power needs were detailed. An all-Westinghouse electrical distribution system was specified to meet these needs. A 2000/2300-kva, double-ended power center, located near the middle of the manufacturing area, feeds ten runs of plug-in bus duct which distribute low-voltage power throughout the plant. Six runs of 600-amp, three-pole plug-in duct are used for 480-v distribution, while four runs of 600-amp, four-pole duct supply 277 wye/480 v for both lighting and power requirements. Use of Westinghouse plug-in bus duct provides a flexible, efficient system which can be easily adapted to any changes in the automated adding machine production line.

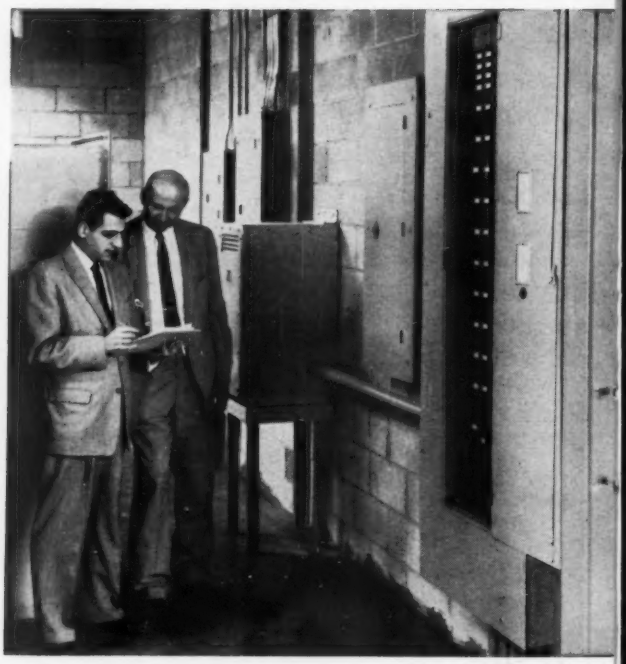
The new Ithaca plant has 50% more electrical capacity than is required by present production needs. The new 146-acre site (as compared to the previous six acres) is ample for anticipated space requirements, while the electrical system capacity can be doubled simply by utilizing the provisions for expansion and the spare equipment now installed. An interesting example of the new plant's expansion possibilities is that the present plant structure can be extended 600 more feet to the back. The location of the installed power centers will allow any necessary new feeders to be installed with minimum distance and voltage drop. In some cases, present bus duct runs can be extended into the new area.

Westinghouse worked closely with the architect, consulting engineer, general contractor, electrical

(continued)

YOU CAN BE SURE...IF IT'S Westinghouse

Conference room discussion includes Charles T. Hansen, Westinghouse Sales Engineer; John M. Schweiger, Schweiger, Heapy & Associates, Consulting Engineers; James Miller, Westinghouse Construction Sales Engineer; Clair Dean, Buffalo Electric Co., Electrical Contractors and Westinghouse Distributor; Ed Likens, Professional Engineer, Lorenz & Williams, Architects and Engineers; and C. W. Vail, Plant Engineer, Adding Machine Division of The National Cash Register Co., Ithaca, N. Y.

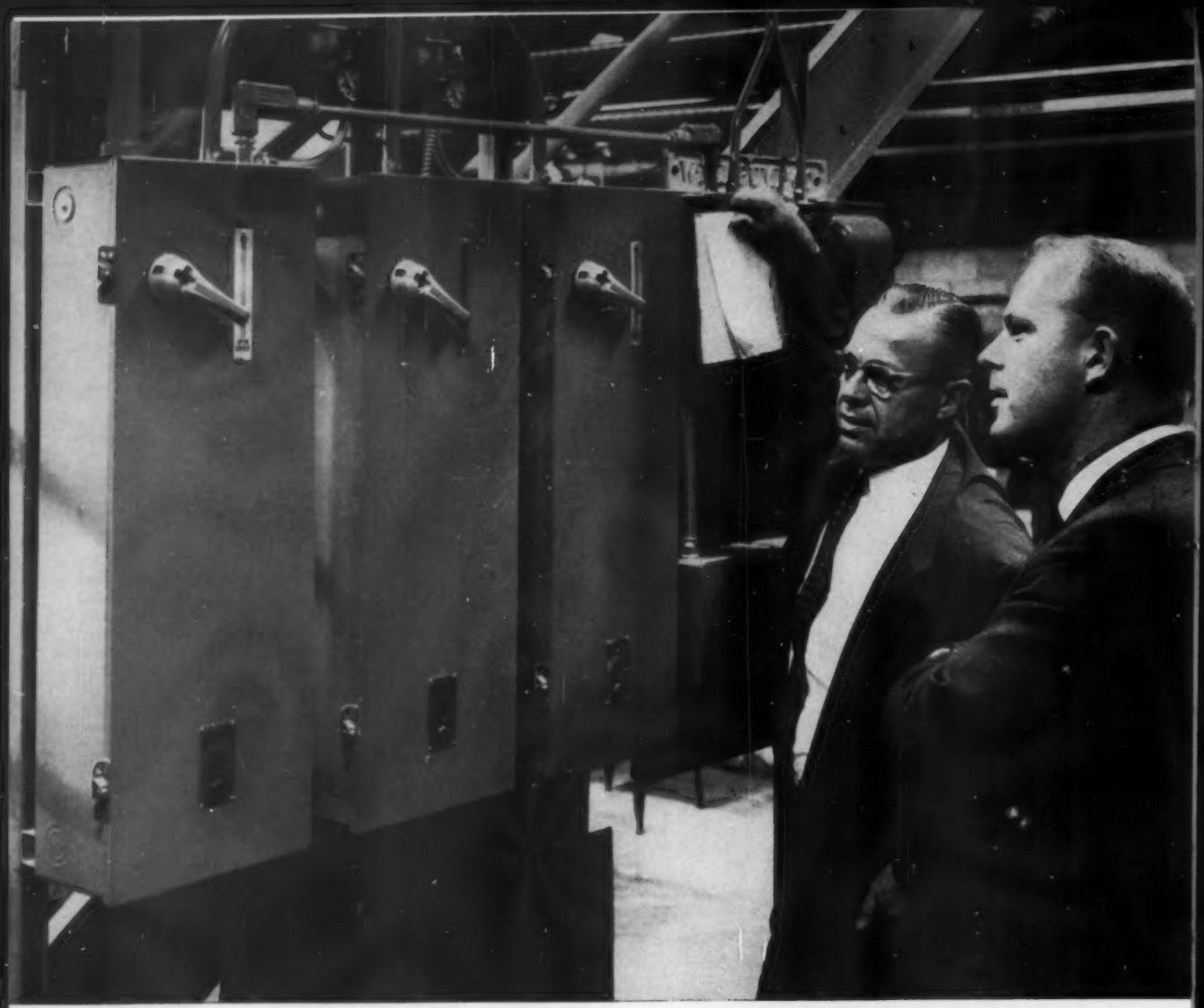


J. Victor Bagnardi, Ithaca representative of Lorenz & Williams, and John M. Schweiger are shown in electrical equipment room. On wall facing them can be seen four Westinghouse panelboards and a Westinghouse 50-kva, 480-v primary to 120/240-v secondary, single-phase, DS-3, dry-type transformer. Two of the panelboards are NLAB 120/240v, one is a NHIB 277/480v, and the opened panelboard in the foreground is a CDP 277/480v. J-94087-2

General plant view shows multiple runs of Westinghouse 2WVO-40R, 277-v fluorescent lighting and 600-amp copper plug-in bus duct. Plug-in units shown are circuit breaker type. Plug-in bus duct and circuit breaker plug-in units are standard requirements in The National Cash Register manufacturing plants.

Clair Dean, John Schweiger and C. W. Vail discuss details of Westinghouse 2000-kva, double-ended (one 1000-kva Inerteen® transformer each end) power center. Incoming voltage of 4800 is reduced to 480 wye/277. Each transformer has provision for 150 additional kva, so only fans need to be added when increased rating is needed. Four spare DB breakers are installed in board to take care of future load and, in addition, four cells are equipped to receive breakers when needed. (Note new switchgear design with three-position DB circuit breakers. Visible positioning tells at a glance if breaker is in "ON," "TEST" or "OFF" position. New "TEST" position allows testing of breaker in switchgear cell with complete safety.)

J-94087-3



Clair Dean and Charles Hansen examine three Westinghouse Class 11-204 nonreversing combination Life-Line® starters which provide control and overload protection for the motors in the equipment room.

50% reserve electrical capacity *(continued)*

contractor and The National Cash Register Co. engineers in selecting the equipment which provides for present and future electrical needs. Westinghouse can also help you with any of your electrical planning and construction requirements. See your Westinghouse distributor, or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-94087-4

Owner: The National Cash Register Co., Dayton, Ohio

Architect: Lorenz & Williams, Architects and Engineers, Dayton, Ohio

Consulting Engineer: Schweiger, Heapy & Associates, Dayton, Ohio

General Contractor: Streeter Associates, Inc., Elmira, N. Y.

Electrical Contractor: Buffalo Electric Co., Inc., Buffalo, N. Y.

Westinghouse Distributor: Buffalo Electric Co., Inc., Buffalo, N. Y.

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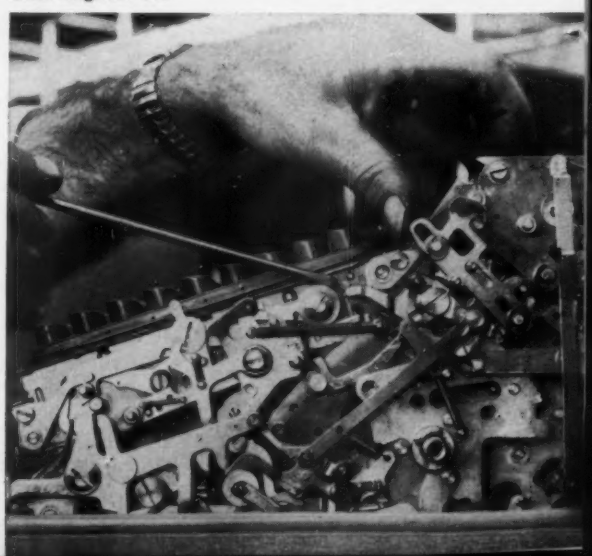
Close-up view of adding machine mechanism as manufactured in Adding Machine Division of The National Cash Register Co.



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With each B&G Exchanger, a Manufacturer's Data Report for Unfired Pressure Vessels, Form No. U-1, as required by the provision of the A.S.M.E. Code rules, is furnished. This form is signed by a qualified inspector, holding a National Board Commission, certifying that construction conforms to the latest A.S.M.E. Code for unfired pressure vessels. The A.S.M.E. "U" symbol is stamped on each exchanger.

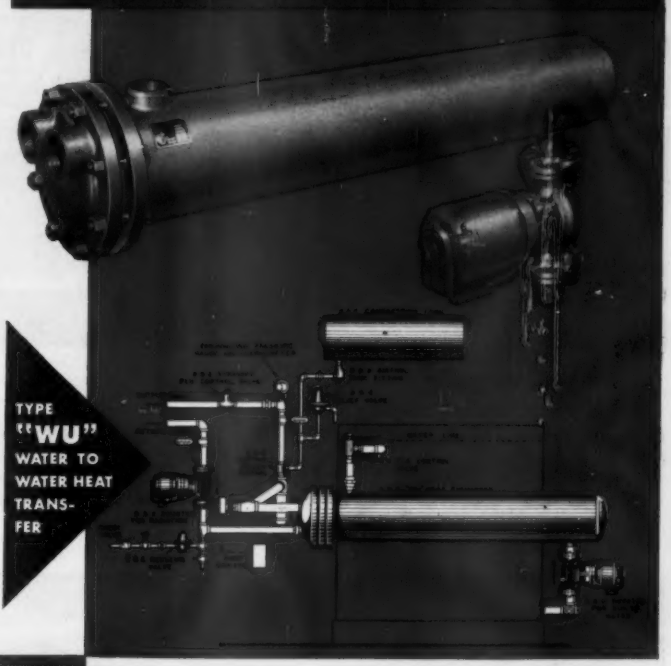
TYPE "WU"

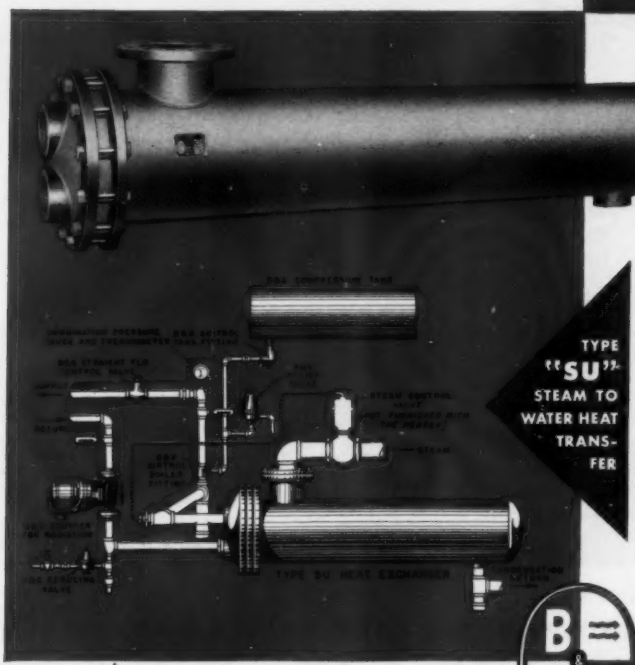
The "WU" Exchanger is equipped with a B&G Booster which pumps boiler water through the shell, greatly increasing the capacity of the unit. An unbelievably small "WU" produces large volumes of hot water. Water temperature is closely controlled... the Booster starts whenever the water goes below the desired degree and continues to run until the water is again at the proper temperature.

When used as a service water heater, a storage tank can be eliminated, because the "WU" heats water as rapidly as it is used.

Heat Exchangers

FOR RADIATION AND WATER HEATING





TYPE "SU"

In buildings where steam is required for process use, the advantages of a forced hot water heating system can be obtained by installing an "SU" Exchanger instead of an extra boiler.

This exchanger also provides an efficient, low cost method of heating water for apartments, hotels, hospitals, industrial and processing plants. No storage tank is needed.

For complete information send for "WU" Catalog No. GC-1054 and "SU" Catalogs No. SC-159 and SI-159.

BELL & GOSSETT

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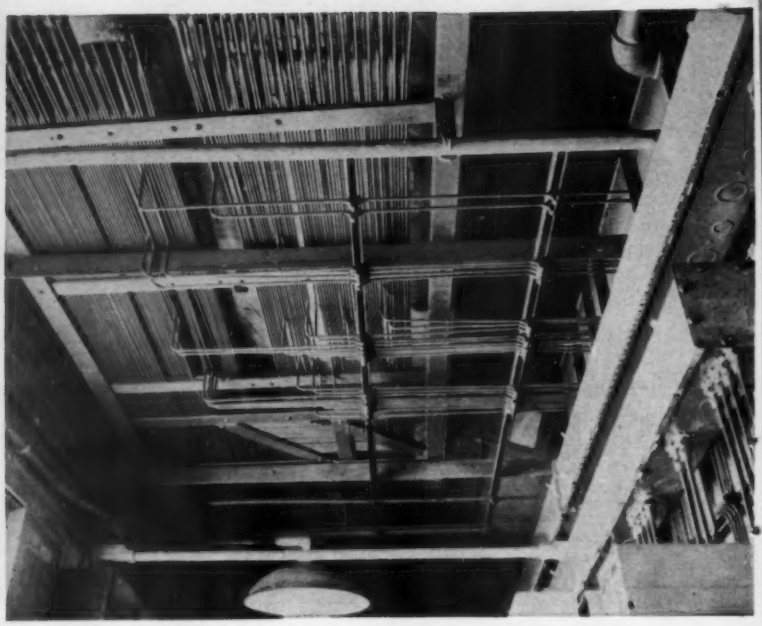
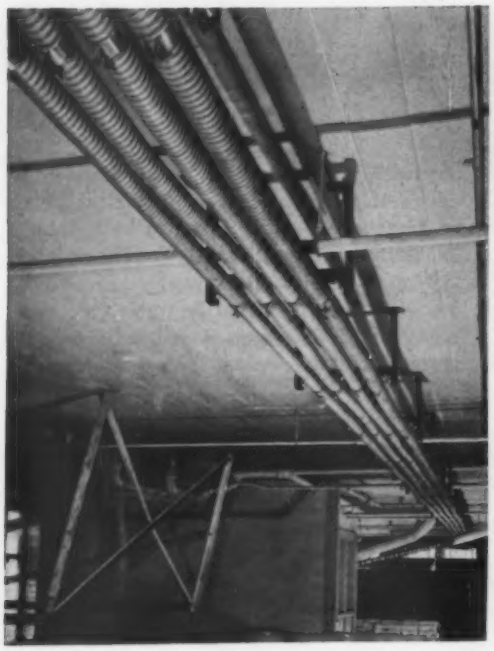
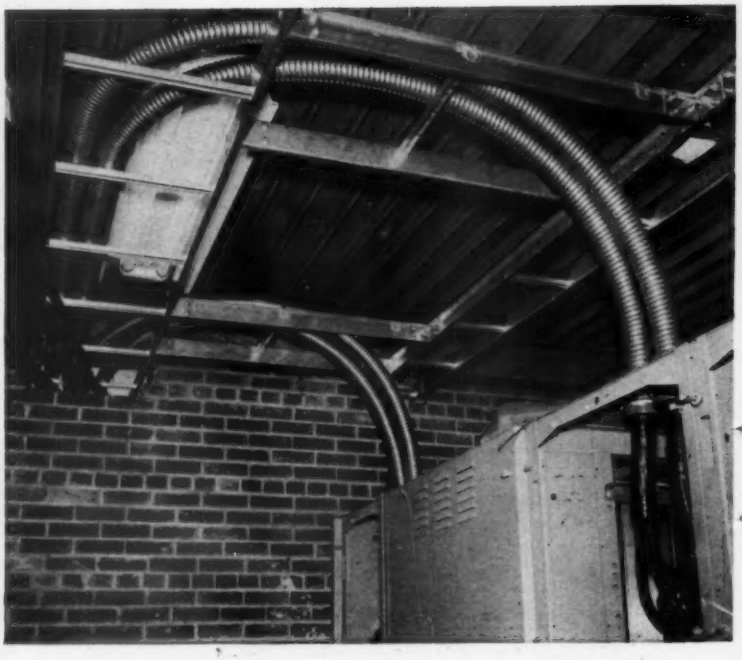
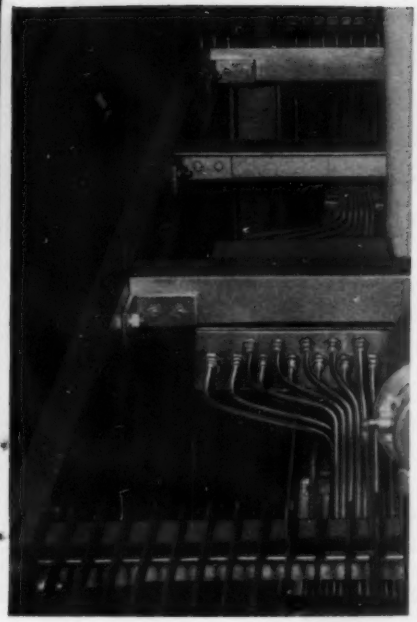


the right combination for





ONLY GENERAL CABLE MANUFACTURES BOTH TYPE MI AND INTERLOCKING ARMORED CABLES. CONTACT YOUR NEAREST GENERAL CABLE SALES OFFICE FOR FULL INFORMATION AND SPECIFICATIONS.



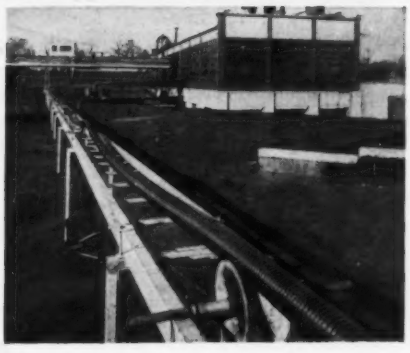
type mi cable

for power distribution, control and lighting circuits

TYPE MI CABLE has solid copper conductors and sheath separated by highly compressed inorganic insulation! Just about indestructible, yet it trains easily over and around obstructions. Naturally it needs no protection: just train it and terminate it. MI is compatible with all other wiring systems. It is completely resistant to moisture, age, nearly all chemicals, temperatures up to 185°F with standard terminations, 482°F with special terminations; and it is approved for use in hazardous areas. It will last forever.

industrial power

Type MI Cable and Interlocking Armored Cable work together to lower installation costs, minimize space requirements, provide maximum flexibility and accessibility in your cable systems.



inter-locking armored cable

for feeder circuits

GENERAL CABLE'S Interlocking Armored Cable combines flexibility with the mechanical protection normally afforded by metallic conduit, yet has the same current rating as cable in free air. It can be trained to fit the contours of buildings and surrounding equipment and provides a neat, compact installation. It is available in bronze, aluminum and steel and may be applied over most cable insulations in the voltage ranges recommended by industry standards. Protective coverings are available to combat environmental conditions which might cause pitting or corrosion of the interlocking armor.

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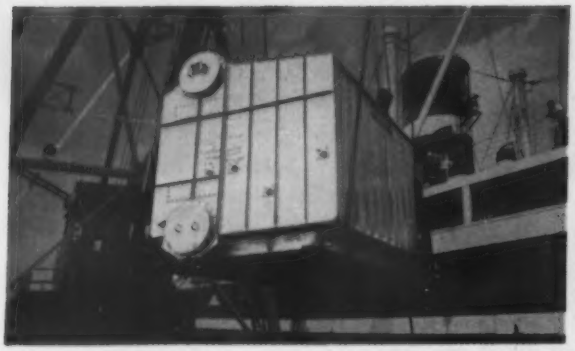
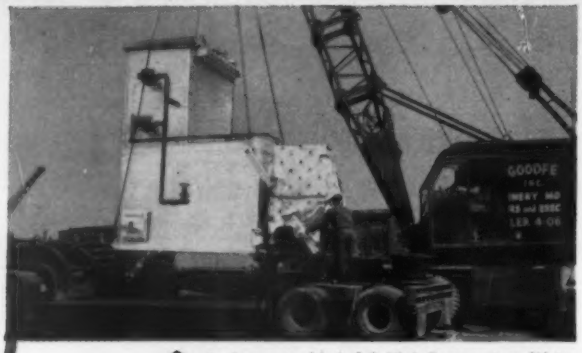


▲ A C-E Package Boiler, Type VP, en route to Europe. This boiler type is available with capacities from 4,000 to 90,000 lb of steam per hr, with pressures to 700 psi and temperatures to 750 F in certain sizes. It is designed for oil or gas firing. Several hundred of these units are now in service.

▲ A shop-assembled Controlled Circulation Boiler, Type PCC, being prepared for shipment. This type unit is available with steam capacities from 80,000 to 120,000 lb per hr, and with pressures and temperatures to 1000 psi and 900 F. For special applications, designs are available to provide higher steam pressures and temperatures. Seven PCC Boilers are now in service.



▲ A shop-assembled C-E High-Temperature Water Boiler, Type HCC, being unloaded at a midwest manufacturing plant. It is one of two 12-million-Btu boilers used for plant heating. Available for capacities from 10 million to 300 million Btu, this unit type is shop-assembled in sizes up to 50 million Btu for oil or gas firing – up to 40 million Btu for coal firing. Currently, more than 50 HCC Boilers are in service or on order.

NOW C-E offers LARGER SHOP-ASSEMBLED BOILERS

Three service-proved designs with capacities to 120,000 lb per hr . . . pressures to 1000 psi . . . temperatures to 900 F

The economies inherent in shop-assembled boilers can now be yours even if your steam requirements are as high as 120,000 lb per hr. The C-E line, consisting of three basic unit types, has been expanded to include pressures, temperatures and capacities well beyond normal package-type limits.

The standard, natural-circulation, ***C-E Package Boiler –Type VP***–is now available with capacities to 90,000 lb per hr, and with pressures and temperatures to 700 psi and 750 F.

Where greater steaming capacity is required, or where higher pressures or temperatures are needed for industrial processing or power generation, the shop-assembled ***C-E Controlled Circulation Boiler–Type PCC***–is available. It is designed for the 80,000-to-120,000-lb capacity range, with pressures to 1000 psi and temperatures to 900 F. For special applications, this unit is also available for considerably higher pressures and temperatures.

The C-E High-Temperature Water Boiler–Type HCC– is an ideal type for large space-heating and certain process uses. It is also available in shop-assembled form for capacities to 50 million Btu per hr. It is designed for pressures to about 500 psi, and can provide water at 450 F or higher.

The new, high-capacity ranges of these shop-assembled units represent the logical evolution of familiar and successful designs that have been proved in service for quality, economy and performance.

Catalogs on any or all of these units available on request.

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C-E

C-202A

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ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 563 on Reply Card

WHAT'S JUST AHEAD IN THIS ISSUE?

- PNEUMATIC instruments and controls will provide accurate service if supplied with clean, dry air. If not, you are asking for trouble. Moisture, oil, rust, scale and dirt are always ready to clog up the works. Turn the page to learn how you can reduce the possibility of meeting up with these troublesome pests.

- AT A. O. SMITH'S plant in Kankakee, Illinois, a well-planned water-recovery system has resulted in a drop of 65 per cent in the annual cost of water. For example, in dollars and cents, water bills during the first six-month period following the program dropped from a previous six-month charge of $20,000 to $7000. To find out how this was done, read the article starting on page 98.

- ERRORS HAVE a nasty habit of cropping up in many industrial drawings. One way to eliminate them is to set down definite do's and don'ts for your drafting department. To assist you, the article beginning on page 109 outlines certain areas where your troubles may be and what to do to correct them.

- PLANT SECURITY costs can be substantially reduced with the exit door supervisory electrical control system described in the article starting on page 113. Meeting all security and National Fire Code regulations, the system is tamper-proof, fail-safe, requires no effort to operate and affords flexibility in the distribution of the watchmen.

- ROCKET FUEL for gas-welding—without machines. That's just one promise of the new rocket age. There are other developments afoot, too—or should we say aloft? There's a rocket-fueled "wand" for fire extinguishing; a rocket for spotting freight-laden railroad cars right where they're needed; and even a maintenance man's aerial "ladder." Read about these developments in the article starting on page 122.

- AREA ENGINEERING at the Parke-Davis plant in Detroit is liked for many reasons. The Area Engineer has a broad-ranged freedom of operations within the scope of his capabilities. If he becomes stymied, he can rely on a group of consultants in Central Engineering. He also has a contractor for carrying out work in his area—the Construction and Maintenance Department. For details, see page 131.

- TO SAY that three-way valves are simply flow-splitting devices is all right for a brief definition. But there is more to these devices than meets the eye. For example, there are port characteristics to be considered for process applications, unbalance stabilization and location. For a general discussion on this type of valve and some of its uses, turn to the article beginning on page 142.

HOW TO GET TOP PERFORMANCE FROM PNEUMATIC INSTRUMENTS

Clean, dry air is part of the answer. Here's data on how you can obtain it.

By CHARLES P. ROHMANN, Section Head, Pneumatic and Mechanical Instruments, Brown Instruments Division, Minneapolis-Honeywell Regulator Company

OPTIMUM operation of pneumatic instruments and control systems depends upon a continuous supply of clean, dry air. Offhand, this would not seem to be a problem, but it is a constantly recurring one. Restriction of the supply line or of the internal instrument passages causes partial or even complete loss of process control.

Many plant air supply systems contain so much water, oil and other contaminants that it is virtually impossible to get the air clean enough for use in pneumatic control systems. The installation of a separate compressor to supply instrument air will minimize the problem, but it will not automatically insure a continuous supply of clean, dry air.

Most water in air systems is the result of water vapor normally present in the air. Occasionally, the water is an accumulation of droplets (rain or fog) entrained in the air intake. In most air systems the air is compressed to around 90 psig.

When air is compressed without change in temperature, its ability to hold water vapor is decreased and condensation may occur. Since air is normally heated during compression, thus increasing its capacity to hold water vapor, condensation occurs after the air cools to the temperature of the surrounding air, either in the capacity tank or the transmission lines. The cooler the air, the greater the condensation.

Pneumatic instruments and control units are designed for precision

service and thus have extremely small nozzles, orifices and restrictions. A precisely machined orifice, designed to pass air at a certain rate, will not pass a drop of water at the same rate. The result is decreased instrument response. Furthermore instruments or transmission lines located outdoors can be knocked out of service by cold weather freezing condensed moisture.

Moisture alone is not the only enemy of pneumatic instruments. Oil may be mixed with the compressed air by old, worn compressors, particularly when overloaded. Overheated compressors can carbonize the oil, causing bits of carbon to get into the air supply.

Rust, scale and dirt are often formed by corrosion of the piping, especially if condensate is present. These corroded particles may be jarred loose by vibration and water hammer, and carried along in the instrument air supply. Scale can be minimized by use of copper, aluminum or plastic air supply lines and brass valves.

Thus, the presence of rust, scale or dirt can add up to instrument and control stoppages and result in the need for frequent shutdowns to clean restrictions, nozzles and supply lines.

Most solids present in the outside air are removed by the intake filter on the air compressor. The particles that do get by, as well as carbonized oil from the compressor, can be caught by an air filter installed in the main air supply line downstream from the capacity tank.

Rust and scale can be prevented by installing a combination air filter and pressure regulator in the air supply to each instrument. This unit has a ribbon-type filter cartridge that removes foreign particles with dimensions as small as 40 microns. Since the dripwell is intended to remove only the final traces of moisture in the air, it has a fairly small capacity and must be blown down frequently through the stopcock in the bottom unless the air supply to the unit is already relatively dry.

High-velocity air from the supply line is driven downward into the filter base where oil, water and heavier particles are deposited. Having been mechanically cleaned, the air then rises at low velocity through the filtering material, which removes the lighter airborne particles.

In most cases, this same filter and dripwell unit will remove most of the oil present in the air. However, in plants where the air supply contains an excessively large amount of oil, an air filter should be installed.

Occasionally, a compressor will be so badly worn that even the two methods just described will be unable to remove all traces of oil. The best solution is to replace or rebuild the compressor. Barring this, the air can be bubbled through a solvent or passed through special filters of standard commercial design.

Before discussing the various methods of moisture removal, let's assume that no matter what steps are taken to dry the air, there still may be some moisture remaining. This occurs even if most of the air piping is free of U-bends or low spots that act as condensate sumps or if low spots exist, they have drains or traps.

Much of the condensate can be removed by providing a trap at the bottom of the capacity tank. Still more moisture can be removed by installing cooling coils in or around the tank.

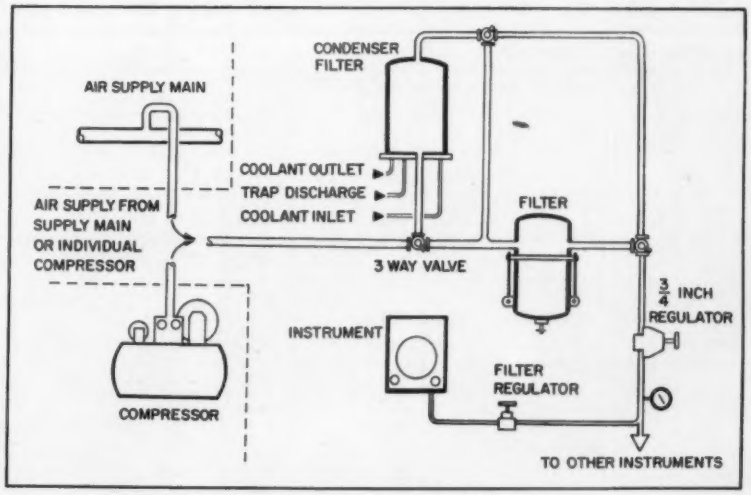
Ordinarily, these steps, plus one of the previously described filter and dripwell units ahead of each instrument, will do a satisfactory job of moisture removal. However, under severe conditions, where instruments or air supply lines are subjected to freezing temperatures, a dryer will be needed.

The condenser-type dryer illustrated in a typical installation is one of the most economical. It uses cooling coils to lower the dew point of the air to within several degrees of the cooling water or refrigerant in the coils. See sketch of dryer installation.

Chemical dryers are sometimes used to remove the last traces of moisture from air leaving a condenser-type dryer. These are chemical agents such as silica gel, calcium chloride and lithium chloride, which must be periodically replaced or regenerated by steam or electric heating elements. This is a factor to be considered in selecting a dryer.

Since dryers can be rather complicated and relatively costly to purchase and install, the proposed installation should be discussed with one or more dryer manufacturers before making a selection. They are experts in the field of air drying and can recommend the dryer that will do the best job for the least money.

Anytime there is a reduction in pressure, some cooling will result. In most installations, there are two locations where the temperature of the air is likely to drop to the dew point—the temperature at which water vapor in the air condenses at atmospheric pressure. One is at the capacity tank, where warm air from the compressor cools to room tem-



Typical condenser-type dryer installation. Cooling coils in condenser reduce air to desired dew point, removing moisture before it reaches the instruments.

perature; the other is at the instrument, where the air may cool still further.

With the average ambient conditions at these two locations known, the dew point necessary to prevent condensation can easily be calculated. The problem is to reduce the water vapor content per pound of air in the air supplied to pneumatic instruments below the amount that can be held as a vapor at the instrument location. The dew point at atmospheric pressure has been selected as a convenient means of describing the absolute humidity of the air. If the dew point required at the instrument is below that of air leaving the capacity tank, a dryer is needed.

Here is a typical example of dew point calculation:

Pressure of air leaving compressor	80 psig
Pressure of air at instrument	20 psig
Most humid condition at compressor intake	72 per cent relative humidity
Temperature of air at intake	80 F
Temperature at capacity tank	80 F
Temperature at instrument	30 F

Dew point of air in system: To arrive at this figure, use the table and the following equation:

$$H_s = 0.62 \left(\frac{P_s}{P\text{-}P_s}\right)$$

H_s = weight of water vapor in saturated air (lb vapor/lb dry air)
P_s = vapor pressure at saturation or 100 per cent humidity (psi at temperature of air)
P = air pressure at point in question (psia)

△ *Dew point of entering air:* See table. Dew point of the entering air, with a 72 per cent relative humidity and 80 F, is 70 F. See figures in triangles.

Dew point at tank:

▭ P=80 psig+14.7=94.7 psia
P_s = 0.50 psi (from table at 80 F and 100 per cent relative humidity) See figures in rectangles.

$$H_s = 0.62 \left(\frac{0.50}{94.7 - 0.50}\right) = 0.00328$$

From the table, the dew point at the tank is 29 F.

Dew point at instrument:

⬭ P=20 psig+14.7=34.7 psia
P_s = 0.082 (from table at 30 F and 100 per cent relative humidity) See figures in ovals.

$$H_s = 0.62 \left(\frac{0.082}{34.7 - 0.082}\right) = 0.00147$$

Dew point at the instrument is 12 F.

Since the required dew point at both locations is below that of the entering air, there can be condensation at both the capacity tank and the instrument if the air is not sufficiently dried.

Moreover, since the dew point at the instrument is lower than at the tank, additional condensation will occur at the instrument, even though much of the moisture condenses in the tank.

In this case, a dryer should be capable of reducing the dew point of the instrument air to 12 F. The logical location for the dryer is downstream from the capacity tank, as much of the moisture will condense in the tank. Where the capacity tank is as cold as the coldest instrument, a dryer is not needed. This is not always necessary, however.

When making a similar calculation to determine the need for a dryer, one would select the most humid condition likely to be encountered at the compressor intake and the lowest temperatures at the instruments and capacity tank that will occur simultaneously.

Pneumatic instruments and control systems are designed to rigid specifications and will provide excellent performance if given consideration and care their importance demands. **End**

Table will assist you in finding dew point of entering air, the dew point of air in system and dew point at instrument.

AMBIENT CONDITIONS (AT ATMOSPHERIC PRESSURE) RELATIVE HUMIDITY AT TEMPERATURE INDICATED													Dew Point F	Saturation Vapor Pressure P_s	Moisture Content H_s
—20 F	—10 F	0 F	10 F	20 F	30 F	40 F	50 F	60 F	70 F	80 F	90 F	100 F			
100	57	33.5	20										—20	0.0082	0.00027
	100	58.5	35	21	13.4								—10	0.013	0.0006
		100	60	37	23	15							0	0.021	0.0008
			100	61	38	26	17.3	12					10	0.034	0.0013
				100	62	41.5	28.5	20	14				20	0.054	0.0021
					100	67	45.5	32	22.5	16	11.6		30	0.082	0.0034
						100	69	47.5	33.5	24	17.4	12.7	40	0.12	0.0052
							100	70	49	35	25.5	19	50	0.18	0.0076
								100	70	50	37	27.3	60	0.26	0.011
									100	72	52	38.5	70	0.36	0.016
										100	72.5	53	80	0.50	0.022
											100	74	90	0.70	0.031

GOOD OFFICE LIGHTING DOESN'T COST— IT PAYS!

Comfortable lighting 10 to 20 times brighter than the average in today's modern offices is provided by two flexible lighting systems in this full size research and demonstration room

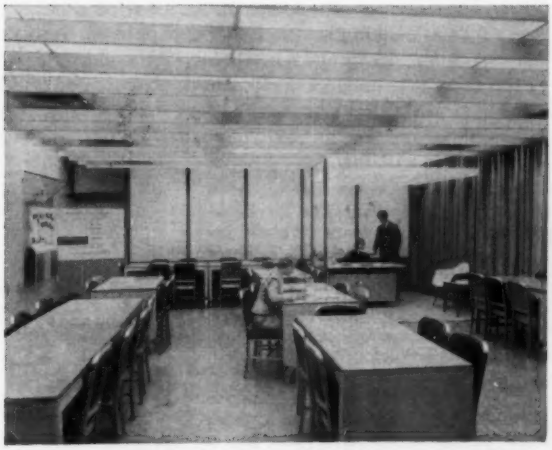
PROVIDING comfortable lighting levels up to nearly 1000 footcandles, a new office lighting demonstration facility was recently opened by the General Electric Company at Nela Park, Cleveland. A new system of ventilating the lighting equipment is used which will virtually cut in half the heating effect of the lighting system upon the air-conditioning load and which can materially reduce heating requirements for the space.

Special demonstration equipment is used in the room by Mr. W. Fisher, office lighting specialist, to show that good office lighting does not cost a great deal compared to other office costs. He uses annual cost of workers, equipment and their productivity to show that an office, relighted from the present average to today's minimum standard level of 100 ft-c need only increase worker efficiency one and one-half per cent to pay for itself.

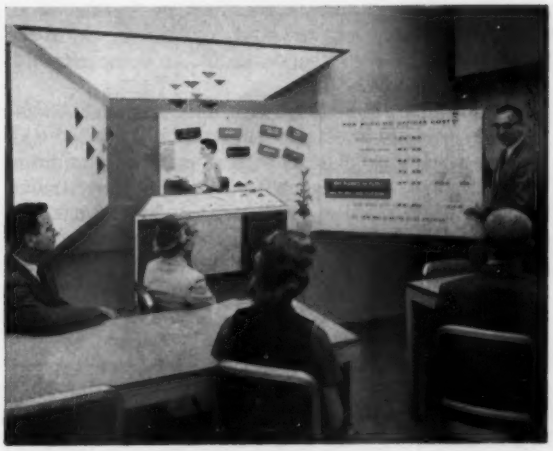
Special emphasis was put on creating a pleasant surrounding for occupants of the office. Important to such an atmosphere is the lighting of walls and other vertical surfaces. Four different wall surfaces are used in the area. Fluorescent or filament lighting is demonstrated with wood paneling, draperies, painted surfaces and a self-luminous wall.

The new office will demonstrate lighting developments to more than 25,000 people every year as they attend lighting conferences and tours through the Lighting Institute. Visitors are always welcome and will be allowed to adjust the battery of dimmers to accumulate data on lighting preferences for various office tasks.

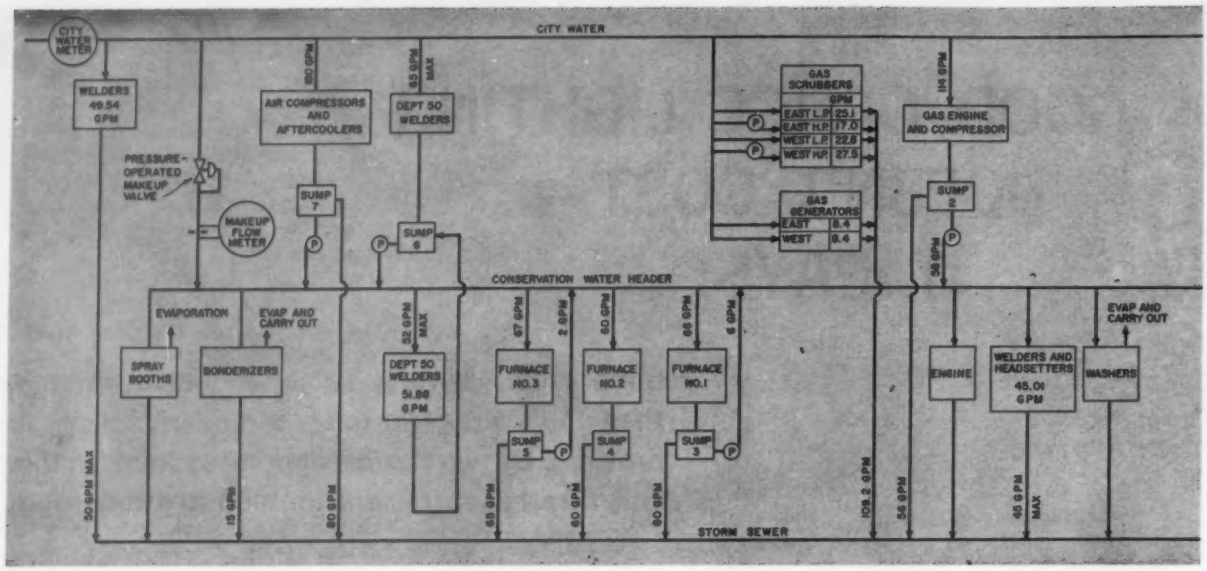
Careful study is being made of the advanced designs of environmental control systems which have been brought together here for the first time. Reports on their interrelationships and performances will be made available through technical papers of General Electric engineers sometime next year. These will be presented to professional societies such as the Illuminating Engineering Society and the American Society of Heating and Air-Conditioning Engineers. **End**



Lighting in demonstration area is integrated with air-conditioning and heating to make savings not possible before.



Economics of office lighting is demonstrated by Will Fisher on this display to show that good lighting pays for itself.



WATER COSTS CUT 65 PER CENT

By GERALD S. BATAILLE, President, Bataille, Kane & McKie, Inc., Chicago

CONSERVATION AND recovery of water is rapidly becoming a "must" in many industries across the entire country. In some locations water conservation is a matter of necessity due to lack of availability. More often the cost of water has become such an appreciable annual expenditure that present day economies demand a curtailment of consumption by employing various methods of conservation and recovery.

Economic means for reducing the volume of water consumed in a plant cannot be properly determined by applying any available type of control or regulator. Economics and practicability must dictate the means to be employed. This requires a thorough evaluation of all costs, all potential recovery and annual net gain to the plant. Means for conservation should be compared with a system for recovery.

For example, if $40,000 worth of re-usable water, presently going to drain annually, can be recovered with a tower system installation, with an overall expenditure of $75,000, it would seem to be a good investment. However, if $35,000 of this water can be conserved by simple and positive means, i.e., control equipment costing say $7500, the tower installation loses its attractiveness as an investment. True, there would be $5000 more water saved per year with the tower system, but there would also be an additional investment of $67,-500. The additional investment for such a small gain is not justified.

There are many instances when a recovery system will accomplish greater all around results than any other means that can be employed. We had such an experience at the A. O. Smith Corporation plant in Kankakee, Illinois. An increase in their water rate caused their annual water cost to rise to approximately $40,000 a year. This was reason enough to have a study made of their use of water and to explore ways and means for substantial reduction.

Our firm was called in by the plant engineer to make this survey, based on the experience we have had in water conservation and recovery and especially on the time factor of our immediate availability of manpower and test equipment.

We started our study on June 4, 1956 with a staff of three of our engineers and completed it by July 26, 1956. The first step was to set up a record of all water consumption within the plant for the past two years. The next step was to make a schematic drawing, Fig. 1, of the present water system that had incorporated in it

About the Author

Gerald Bataille, born way back in the roaring nineties, has a background of over 25 years of plant engineering experience with Kelvinator Corp., Rempe Co., Campbell Engineering Company and Hussmann Refrigerator Company. During these years he frequently visualized an engineering service, supplying qualified and experienced consultants, who would work with and save time for their client's engineers. He formed such an organization in the firm of Bataille, Kane and McKie that has salvaged more than $10,000,000 for his clients in water that formerly went down the drain.

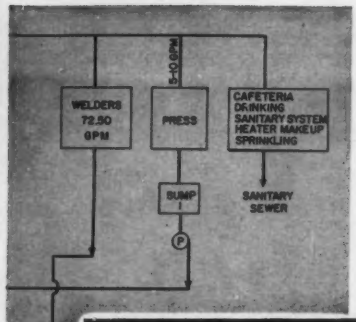
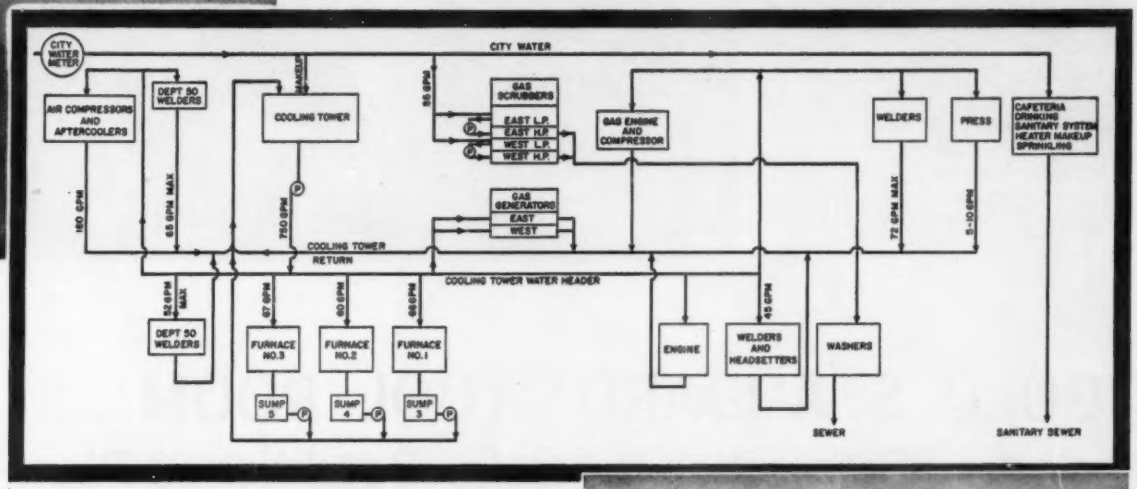
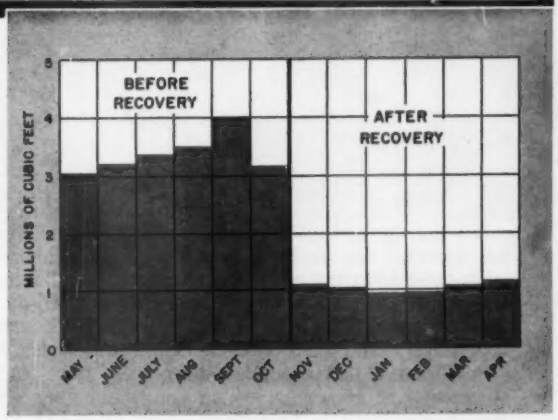


Fig. 1. Left: This sketch shows how water distribution system was laid out at the plant of A. O. Smith, Kankakee, before the conservation study was made and the cooling tower had been installed and other suggested changes were made.

Fig. 2. Below: This sketch shows the water distribution system as presently installed. Fig. 3. Bottom sketch: This chart shows the amazing drop in water consumption at A. O. Smith following adoption of the conservation plan and installation of the water tower and piping changes.





a re-circulating loop doing a good job on water conservation.

Water flow was measured to determine water consumption of each piece of equipment.

Recording thermometers to show temperature variables, water meters, calibrated buckets or pails, some hand thermometers and stop watches make up the major portion of the test equipment needed for this type of work.

From all this data the total water volume and heat load was accurately calculated to determine the total amount of work the coolant water was doing.

At the completion of this study we concluded that approximately $24,000 of an annual $40,000 water consumption could be recovered and re-used with a central cooling tower system. However, in order to recover this much water, it meant an outlay of $28,000 for A. O. Smith Corp. to cover the cost of all necessary piping, equipment, materials and labor.

We believe the results attained are a good example of what can be accomplished with a well planned recovery system.

Prior to the installation of the recovery system, Fig. 2, the average monthly water consumption was 3,408,-916 cu ft. After recovery it was 1,066,100 cu ft. This represents a drop of 69 per cent in average annual water consumption. Due to the structure of the water rate, the drop in the annual cost of water was 65 per cent.

Prior to the installation of the recovery system, the average monthly billing on water was $3,374.08. After recovery, it amounted to an average of $1,178.47 per month. Based on these two 6-month periods, this represents an annual water cost of $40,488.90 before recovery vs. $14,141.60 after recovery, which is an annual reduction in water costs of $26,347.30.

Over a period of seven years, we have utilized most every conceivable means for the conservation and recovery of water. Each method and each piece of equipment has its place in this field of economics. It usually takes considerable engineering time and effort to prove the benefits to be derived and calculate the cost and means to be employed to accomplish such results. Such time so spent will be well worth the effort, as few plant economies are as profitable as carefully worked-out water conservation and recovery projects.

Good water recovery projects usually pay out in 5 to 15 months, and then continue to earn a profit for the plant for many years to follow. **End**

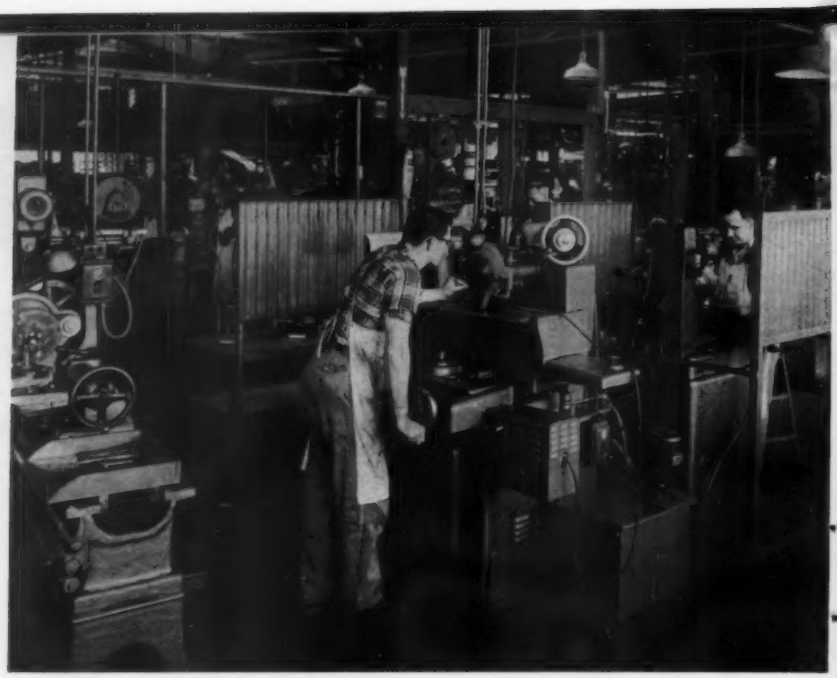


Fig. 1. Gold finish of machines in tool room gives area "quality" appearance.

"GOLD STANDARD" TOOL ROOM . . .
Bellwether for Color-Conditioned Plant

By JOHN W. RADZAK, Production Manager, Universal Form Clamp Co., Chicago

TAKE A 17-YEAR old plant, grown gray and grimy from continuous production, color code everything visible to the eye except the ceiling, and what do you get? A more attractive, more "livable" plant, certainly, but at the Universal Form Clamp Co., we found that the numerous other benefits which we gained were equally important. Our company, concrete form specialists since 1912, manufactures and sells a complete line of products used in concrete construction.

The Universal Form Clamp Co. was founded in 1912, and moved into its present building in 1943. This plant, located in Chicago, has approximately 63,200 sq ft of floor space devoted to manufacturing operations at ground level. Part of the space above is utilized for general offices. A railroad siding, railroad and truck loading docks and the employee parking lot occupy another 117,033 sq ft of space outside the modern brick building.

Practically all manufacturing operations required to produce our line of products are performed in this plant. All types of metal-working and forming equipment are employed, including heavy 100-ton presses, multi-purpose presses, wire straighteners, automatic welders, slab bolster machines, snap tie machines, saws, turret lathes, threading machines and panel cleaning machines.

Materials Flow

Movement of materials and finished products through the plant is handled by manually-moved trucks, lift trucks and an overhead hoist that runs on rails the entire length of one plant bay. Because the plant was re-designed especially for the production of our products, the flow of materials from receiving areas to shipping docks is better than average.

In keeping pace with the record growth of the construction industry, the demand for Universal's products left little time for the development of any comprehensive plan for plant maintenance. In 1958, however, top management, headed by Mrs. Elsa Mayers, President, and J. I. McClelland, Vice-President and General Manager (who had learned Navy ways of keeping things ship-shape in World War II), decided that the time had come to completely refurbish the production areas of this plant.

At the time this modernization program began, there was no overall plan for color-coding either the various elements of the building structure or the machines. Accordingly, the development of a plan for color-coding everything in the plant except the ceiling (which is white for maximum reflectivity) was the first step in our plant modernization program. After a study of the plant layout and the plant facilities, a plan was formulated to not only enhance appearance, but to increase safety and improve production efficiency as well.

Floors, which are hard maple block cut across the grain, were

cleaned. Aisle areas required for the free movement of lift trucks and material being moved from one production operation to another, were widened and marked with bright yellow stripes. Following this same color system, doorways and overhead projections that might interfere with the movement of fork lift trucks were marked with alternating yellow and black stripes. All equipment that moved from place to place in daily operations such as lift trucks, was painted bright yellow.

Safety Is Important

Careful attention was given to plant safety. Wherever plant fire fighting equipment is located, a broad, bright red stripe is painted from floor to ceiling. Pillars and posts with hose stations and/or extinguishers are painted red on all four sides. There is no doubt as to where the fire fighting equipment is located—these clearly marked spots can be seen in all parts of the plant.

Although all plant machinery had received normal wipe-off cleaning and scrubbing from time to time, the accumulated grime of years made most machines look twice their age, and the prevailing color, if it might be called a color, was greasy gray. Steam cleaning was therefore imperative, but as a complete plant shutdown for an indefinite period of time was obviously impossible, machines were individually scheduled for cleaning and painting.

Clean-Up Came First

High pressure, high temperature steam, with a detergent in solution, combined with partial machine disassembly and brushing, soon removed the accumulated grease and grime. In the use of the steam jets, some practice was required before plant personnel became expert in the "peeling" technique most effective in the fast removal of the heavier layers of dirt.

As machines were steam cleaned, moisture and debris were removed from the floor at intervals as work progressed. Much care had to be taken to keep the hardwood floor from swelling. A mixture of sand and sawdust, spread in a heavy layer over the floor under and around the machine, absorbed the water condensing on the machine and in the air, and allowed enough time for complete machine cleaning before it became necessary to re-

Fig. 2. Top: On this crane yellow and black stripes flash a stand-clear warning. Fig. 3. Center: Yellow and black striped rails warn aisle traffic to stay clear of this machine. If warning fails heavy posts protect machine from damage. Fig. 4. Below: Ends of rails projecting from these storage racks are painted bright yellow as a warning to all passing plant traffic.

Fig. 5. The post on which this fire extinguisher is located is painted red. Arrow provides additional visual aid for safety.

Part	Color
AISLES, PARKING BAYS Both sides, all enclosures	Yellow (broad stripe)
MOVING EQUIPMENT Lift trucks, transporters, etc.	Yellow
KEEP-CLEAR POINTS Doorways, guard rails, overhead hoist, etc.	Alternating yellow and black stripes
PRODUCTION MACHINERY Machine bases, stationary parts	Green
Flywheels, other moving parts, guards, rails other safety parts	Yellow
Switchboxes, other electrical parts	Red
TOOL ROOM MACHINERY Machine bases, stationary parts	Gold, black trim
Flywheels, other moving parts, guards, rails, other safety parts	Yellow
Switchboxes, other electrical parts	Red
FIRE STATIONS Posts, stands, hose stations, etc.	Red

Fig. 6. This is the basic color coding system used throughout the plant. Yellow or red are standard "danger" colors.

GOLD STANDARD . . .

move the sand and sawdust mixture.

Once a machine was clean, much more than the need for new paint was often revealed. The need for replacement of some parts, and for adjustment to compensate for wear, was apparent when it became possible to obtain a clear and unobstructed view of a machine. Conditions which could have caused serious interruptions of production were revealed, and corrected.

Cleaned and repaired machines were "color synchronized" for appearance, to improve production and to increase safety. In the main plant production areas, machine bases and other stationary parts were painted a medium green color. Moving parts, such as flywheels, were painted a bright yellow. Some safety parts, such as guards and rails, also were painted a bright yellow. Electrical parts, switch boxes, etc. were painted red.

Here again, in painting these machines, plant management discovered for itself improved methods of finishing. In all finishing operations, plant maintenance personnel are utilized. But it soon was found that an inordinate amount of time was being spent in applying paint with brushes—and the results, generally, were unsatisfactory. Because of the many curves and convolutions of the machines, runs and sags in paint were frequent, and "soft spots," brush marks and other unsightly blemishes spoiled the finish. The solution was simple—the acquisition of an air-spray painting unit which can deliver 5 to 10 psi pressure at the nozzle. This low pressure permitted spray painting without "bounce-back" or contamination of the air in the plant, thus making it possible to finish machines while production continued uninterrupted in close proximity.

With a few brief practice sessions, plant personnel were able to apply paint in thin, even coats providing complete coverage that was, at the same time, completely free from runs and sags. The simplicity of this spray unit makes possible the savings of a tremendous amount of time in refinishing operations, and management believes that the equipment has already paid for itself many times in speeding this work. As all machines are now scheduled for periodic check-ups and refinishing, the spray unit will be used regularly in the future.

Tool Room, the "Heart"

One of the most unique color coding operations in the entire plant concerned the tool room. In this plant, as in many others, the tool room is the "heart" of the plant. Here, we maintain the tools essential to precision workmanship and quality products, and many special tools are produced by the tooling department's own equipment. Therefore, to symbolize the adherence to precision production and the quality which is inherent in all Universal Form Clamp Co. products, all tool room equipment was finished with a rich gold lacquer and trimmed in black.

Throughout the plant, numerous other small items have been included in the master color plan. Even the wire mesh screens surrounding the tool room and other restricted-access areas were given a neat coat of green or gold paint. Racks at machines and on wheels received a black finish. Similar color schemes were devised for virtually every plant item.

Since this program began, a marked change has been noted in the attitude of the workmen toward

Fig. 7. Portable steam generator makes it possible to clean equipment in any part of Universal Form Clamp's plant.

Fig. 8. Left: As an aside, this photo shows the need, recognized by company's management, for "environment conditioning" of old welding booths. Fig. 9. Below: shows new welding booths have ample light and ventilation.

their equipment. A real effort is made to keep machines in the bright, like-new appearance they now exhibit. Also, there is much less clutter in and around the machinery. After hours, recently, one machine operator was observed carefully wiping down and polishing his machine, with obvious pride.

When most of the plant refurbishing had been completed, a plant tour was organized for the office employees of the company. Subsequently, a tour of the office facilities by the production employees was organized. With each tour, a noticeable improvement in human relations was the result.

In a few instances, office and plant employees who had talked to each other on plant intercommunication equipment for years had actually never met face-to-face. Now, office and factory employees have a more personal interest in each other and in the relationship of their work.

Thus, the initial simple idea of clean-up and paint-up has grown into a greater program—one that has paid many dividends, not only in better working conditions, but in improved production efficiency, increased safety, better maintenance and elevated employee morale, both in the factory and in the office. The intangible value of this program as a symbol of company policy to customers is more difficult to evaluate, but there can be little doubt that it has played an important role in emphasizing the progressive spirit of all company operations. **End**

Fig. 10. Right: Two machines in typical before-refinishing condition. Fig. 11. Below: Spic and span condition of machines after finishing is apparent.

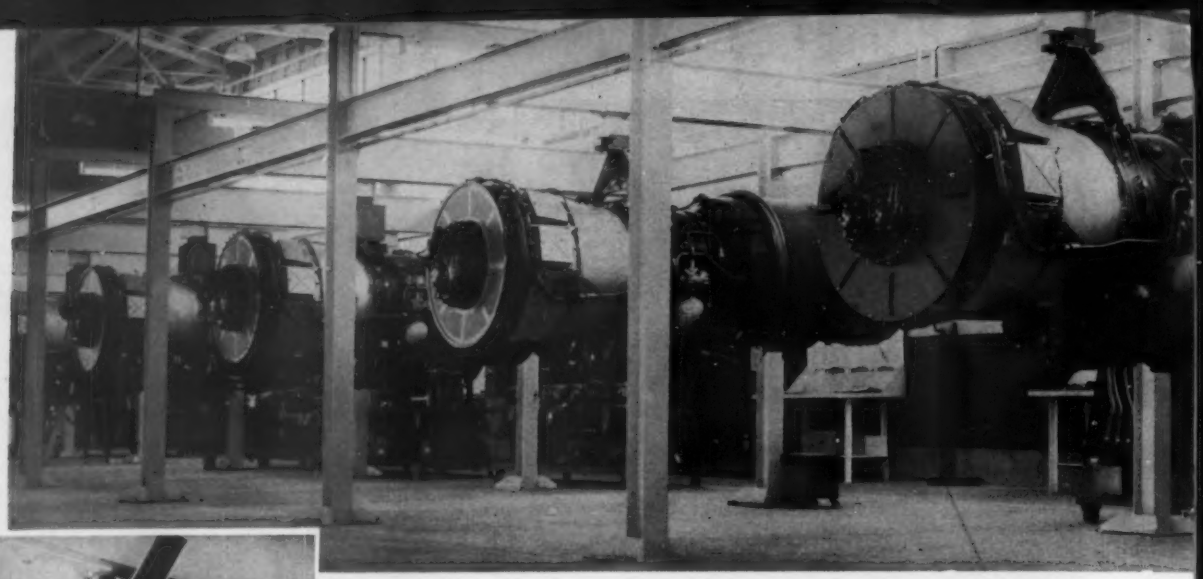


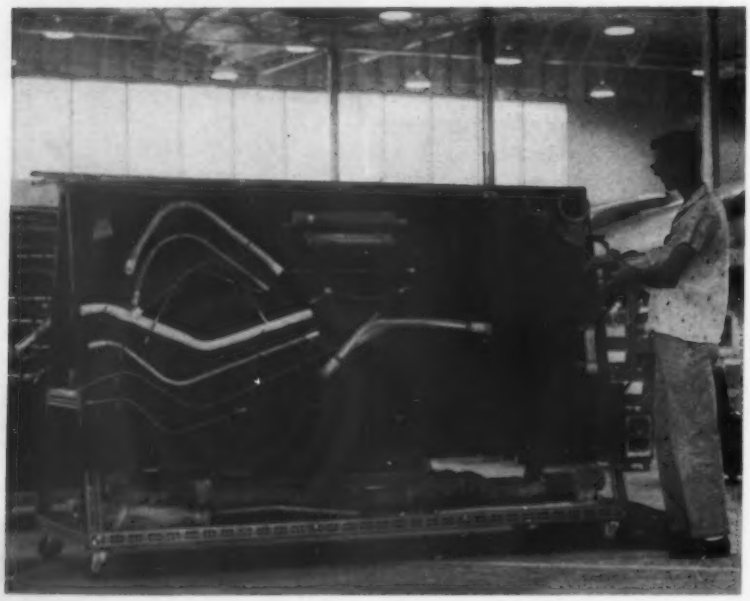
Fig. 1. Jet engines hang from specially-designed gantries which replaced dollies.

Fig. 2. Detail of quick-disconnect on gantry from which the engine is hung.

HANDLING AIDS—
Peg Boards and Gantries

NEW CONCEPTS in materials handling have been designed into a new building used for the assembly and shipping of jet engines at Ryan Aeronautical Co., San Diego, Calif.

Fig. 3. Use of erector set frame helps prevent misinstallation of engine parts.



Instead of moving engines past the parts during assembly, parts are brought to the engines on "A" frames. The frames, Fig. 3, made of 4-ft by 8-ft peg boards, are placed beside the engines. Each one holds all the parts necessary to complete the build-up of an engine; parts are removed from the board in the sequence in which they are installed.

The jet engines are hung in position for assembly from stationary gantries by Ryan-designed quick-disconnects, Fig. 2. These permit the engines to be put in work-ready position in 24 man-minutes each, as compared to 20 man-hours using conventional methods.

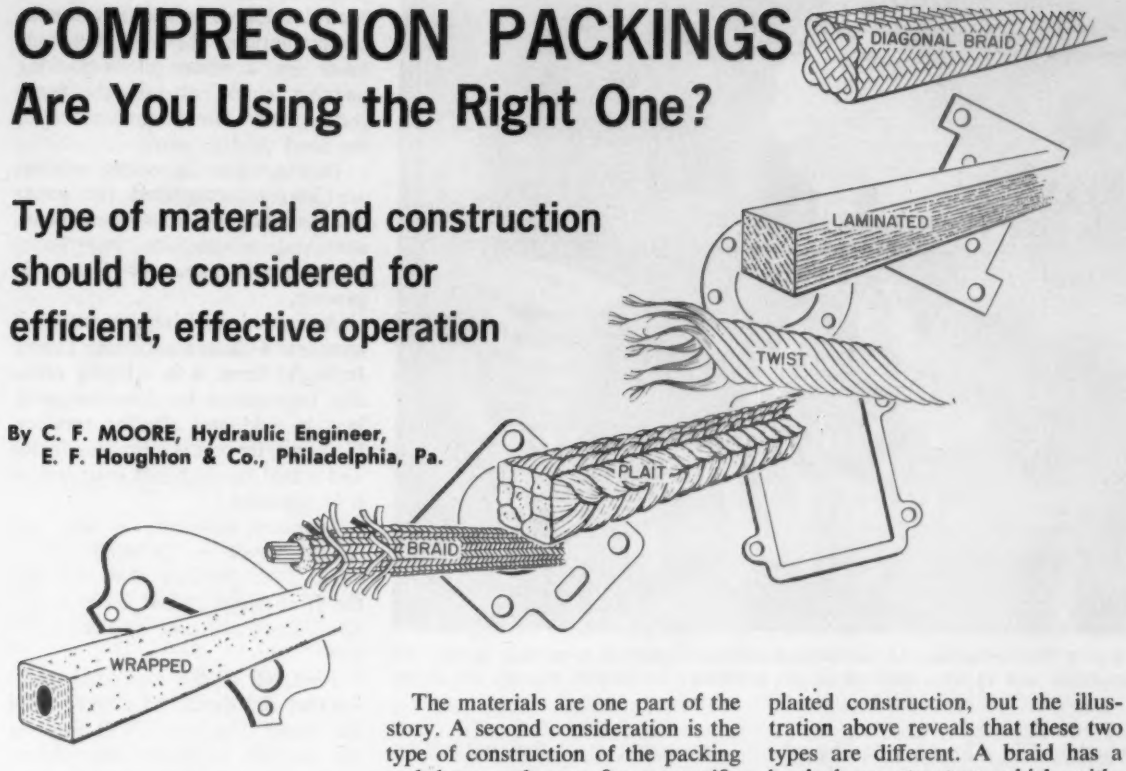
A considerable amount of money was saved by constructing the steel I-beam gantries. Conventional mobile lifting and build-up dollies cost about $8000 each, while Ryan built the gantries for approximately $500 apiece.

After final inspection, a mobile lifting dolly is used to remove the engine from the gantry. The engine is then wheeled under a five-ton capacity overhead crane, from which it is loaded onto a truck for shipment to another plant. **End**

COMPRESSION PACKINGS
Are You Using the Right One?

Type of material and construction should be considered for efficient, effective operation

By C. F. MOORE, Hydraulic Engineer,
E. F. Houghton & Co., Philadelphia, Pa.



THERE ARE MANY sound technical bases for the design, construction and application of rod and sheet type compression packings. But these principles are frequently overlooked by packing users. The result is improper choice and application of many of the compression packings presently available.

Therefore a re-appraisal of the basics is in order. From such a study we should be better able to select and apply these packings.

A number of packing materials—flax, jute, cotton and asbestos—some of which were used a hundred years ago are still being recommended for a variety of packing applications. A newer material, Teflon, is being called upon to solve many of industry's new sealing problems.

Flax and jute are recommended for water applications due to their absorptive characteristics. Cotton, because it is soft and pliable, is used to minimize the danger of scoring the shafts which it contacts. Asbestos, being a mineral rather than a vegetable product, is resistant to the many acids and alkalis that industry is handling today.

The materials are one part of the story. A second consideration is the type of construction of the packing and how each one fits a specific condition. The twists, plaits and braids of rod seal packings have been familiar to several generations of maintenance men. But not so familiar are the whys and wherefores of the choices these constructions necessitate.

Twist is the basic construction. It is recommended for a broad range of small diameter shafts and rods. Its unique asset is the fact that it can be easily unravelled by the mechanic to adjust its cross section to the size of the gland.

Plait construction has the advantage of being soft and pliable. This makes it relatively insensitive to the compression created by adjustment of the gland ring.

This lack of sensitivity is especially desirable when the plaited packing is used on a rotating shaft because it minimizes the danger of excessive pressure of the packing on the shaft. A rotating motion does not dissipate heat as easily as a reciprocating motion. Therefore the trapped frictional heat generated by excessive pressure "cooks out" the packing lubricant and the dry packing either burns, or breaks down and erodes the shaft.

Braids are often confused with plaited construction, but the illustration above reveals that these two types are different. A braid has a hard dense structure which withstands the abrasive effects of reciprocating motions. For this reason it finds wide application in reciprocating pumps, valves and expansion joints.

Both plait and braid have distinct advantages which have been

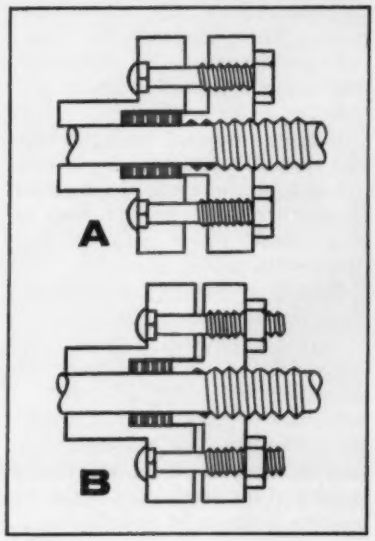


Fig. 1. Illustration A shows freshly packed gland. Note compressed rings in illustration B. It is time to repack.

Fig. 2. One advantage of the twist type construction in a packing is that the material can be untwisted to adjust cross section to the size of the gland.

combined in a fourth type of packing which is braided diagonally and because of this has the density of braided construction but the flexibility of a plaited packing. Most of the large suppliers offer such a packing under various names.

Laminated packings comprise yet a fifth construction type. They are built up of either horizontal or diagonal layers and can be obtained either soft or cured "rock hard". One of the most popular laminations is known in maintenance circles as "cross expansion". They make ideal packings for pump seats, seat rings, and anti-extrusion rings because their dense construction resists distortion.

Various wrapped packings are also produced. These usually involve a folded or concentric construction around a core of duck, rubber or even metal. Wraps are also produced with hollow cores.

Rod type packings, except for such materials as metal foils, are usually impregnated with a compound made up of graphite and oil. At one time a single oil probably was made to suffice no matter what the sealing job. But today the various oils used have been specifically developed for insolubility in the respective fluids to be sealed.

Impregnation of the packing accomplishes two worthwhile purposes. By filling the voids among the fibers of the material, it improves the sealing qualities of the packing. And it provides an all-important lubrication for the rod or shaft as the impregnant is forced from the material by the pressure of the gland nut.

Some suppliers coat the packing with lubricant by drawing or dipping the finished product in a bath. Other suppliers carry the idea several important steps further. They impregnate each strand of material prior to braiding, plaiting, or twisting. The maximum and uniform penetration thus gained deposits sufficient impregnant within the cross section of the packing to respond to the pressures of subsequent adjustments of the gland nut.

Reference was made, a few lines above, to the refinements which have been made in impregnants. This is especially true of impregnants for the so-called "edible" services—pharmaceuticals, foodstuffs, and beverages—in which contamination of the sealed fluid by the oil or graphite of the impregnant cannot be tolerated.

For such critical applications, special edible impregnants which are colorless, odorless and tasteless have been developed. In addition to non-contamination, these impregnants make for a white, clean looking packing which enhances the much sought after sterile appearance of the food or drug plant.

Packings for the edible services are also recommended for paper and textile applications where a conventional oil-graphite impregnant might mark paper or goods in process.

A discussion of impregnants isn't complete without mentioning Teflon. In liquid form, it is a highly effective impregnant for asbestos packings in acid and alkaline services. However, its cost is a limiting factor and a real need should exist before it is specified.

Properly installed, a rod seal should never be jammed into a gland. The pressure that will seat the fresh rings should come exclusively from adjustment of the gland nut.

First, all of the expended packing material should be cleaned from the gland. The two lowest rings in the set will probably look almost as fresh as the day they went in because most of the "squeeze" shows up in the compression of only the top rings. But much of the impregnant in the lower rings has also been consumed. And in a short time you'll be calling on burned out packings in the bottom of the gland to do the sealing job of fresh rings. Therefore, discard all old rings and re-pack with fresh material.

Install Gland Ring Hand-Tight

The gland ring should be installed over the new packings, and fastened down only hand-tight. A compression packing is supposed to limit leakage, not stop it. In fact, a certain amount of leakage is desirable to help lubricate the rod or shaft.

If an attempt is made to stop leakage by tightening down hard on the gland nut, the impregnant in new rings is being expended needlessly. Adjustment after adjustment is necessary and the packings are soon squeezed dry. Too much initial pressure on the gland nut is the prime cause of short-lived packing installations.

Another error in the installation of a rod seal packing occurs when

a length of the material is looped into the gland or wrapped around the shaft. Installed in this manner, the material cannot seat itself to fill the gland properly.

No matter whether the packing is being used from a coil, spool, or spiral, individual rings should be cut for scarf or butt joint and installed one after the other in the gland with the joints staggered at 90 or 180 degrees. The "lay" of the rings can be further improved by the use of packings which have a squared cross section. Many suppliers square their materials as a final production operation.

For Gaskets, Tight Fit

We said above that a rod seal packing should be initially compressed only hand-tight by pressure on the gland nut. But in the case of a gasket, exactly the opposite is recommended. The bolting action on a freshly gasketed joint is called "seating force".

After the gasket is installed the joint is immediately bolted down tightly with enough seating force to generate a "flow" of the gasket material into the scratches, imperfections, and irregularities of the joint faces. This is the basic principle by which the gasket seals. The initial loading on the bolts can be reduced without damaging the seal.

Sheet-type packings are every bit as specialized in their usage as are rod seals, and as much care should be given to their specification. Homogeneous Buna N, for instance, is specified for its high resistance to oil. This implies low solubility, swell, and abrasion, plus a retention of tensile strength after immersion. Buna N does well against alkalines, gasoline, petroleum solvents, etc., over a temperature range of —60 to +300 F.

But a serious shortcoming of Buna N in certain applications is its poor resistance to sunlight and climatic conditions. This material seals well in air and water and is actually more water-resistant than natural rubber. Its useful temperature range extends from about —60 to +25 F.

In its mechanical properties, homogeneous Neoprene is closer to natural rubber than most of the other synthetics. It is vibration resistant and has good compressibility and recovery. The Neoprene gasket will not corrode the metal joint faces with which it is in contact because Neoprene is not vulcanized with sulfur. Neoprene seals well against non-aromatic gasolines, air, water, high analine oils, and refrigerant gases.

The above summary by no means completes the list of homogeneous rubber sheets being used today.

One of the properties peculiar to homogeneous rubber is hardness as measured by a specialized instrument called a Shore Durometer. In general, lower durometer (softer) rubber should be used for more irregular joint faces, and when the gasket is to be secured between the flanges by light bolt loadings. Higher durometer rubber should be used with more heavily loaded bolts and for smoother surfaces on joint faces.

Compressed rubber and asbestos sheets are produced by mixing the shredded asbestos and raw rubber polymer with a solvent. Neoprene, Buna N, and Buna S are a few of the synthetics regularly compressed with asbestos to form sheet packing materials. The Neoprene compression finds application in aircraft gaskets. It is a non-absorbing, minimum swelling, packing and retains its tensile strength in low pH, heat, and solvents.

The Buna N compression has exceptional heat resistance, and its applications include sealing caustic soda, petroleum, and chlorinated hydrocarbons. Buna S and asbestos has special properties which equip it to do a good job in superheated and saturated steam over a fairly broad temperature-pressure range. It can also be used in air, some gases and acids.

Vegetable fiber, known among maintenance men as "paper" packing, also belongs in the category of compressed sheet material. It is constructed of fibrous material impregnated with a chemical compound to fortify its sealability.

This material is economical and provides an effective seal for water, gasoline, compressed air, and inert gases. But temperatures and pressures should not be extreme. Where temperature is above 200 F, one of the compressed rubber and asbestos sheets will probably be the answer. If the problem is pressure (blown gasket) a laminated or re-inforced sheet is required. These are constructed sandwich-fashion of two plys of rubber with a nylon or duck midsection. **End**

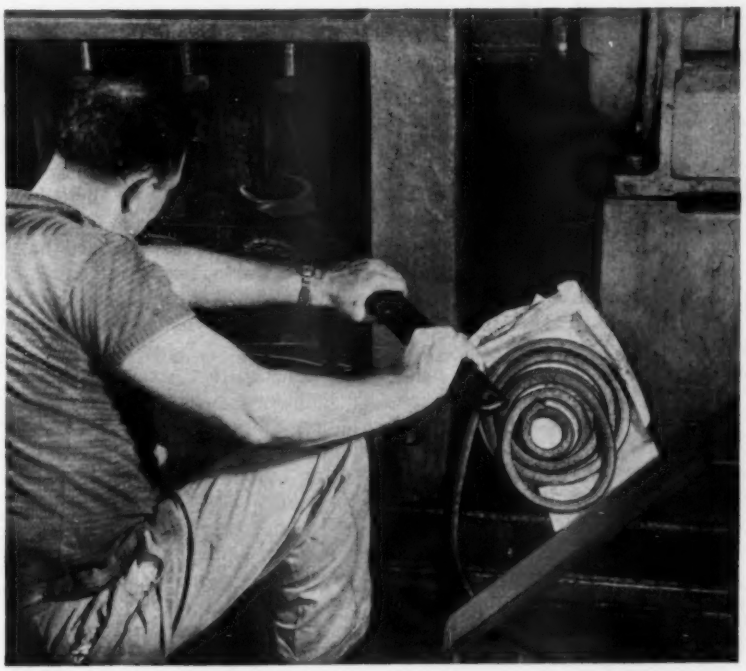


Fig. 3. Although removal of the gland nut on this compressor requires a large wrench, after new packing is installed, nut should be replaced only hand-tight.

Right: Cutting head spindle is overlaid with hard-surfacing alloy by the Sprayweld process. Pistol is mounted on lathe and lathe's traversing mechanism is used to pass pistol spray of metal across the surface.

Left: Mechanically bonded hard-surfacing powder is then fused to the base metal by applying the flame of an oxyacetylene torch as the spindle is rotated in the lathe. Rotation insures uniform distribution of heat.

METAL SPRAY PLUS HEAT— TOUGH SURFACE COATING

A LARGE SOUTHERN steel mill has improved the service life on plant equipment by hard-surfacing parts exposed to excessive wear.

A case in point at this plant is an infacer spindle which carries a cutting head. The cutter is used in the pipe mill to face the pipe ends as they come from the mill.

The spindle is 6 in. in diameter and 66 in. long. The area of the spindle which is most subject to wear is 15 in. long and runs in a hardened brass bearing where it is exposed to extreme abrasion conditions. Operating speed (revolutions per minute) of the spindle varies from slow to fast, depending on the pipe diameter.

In preparing this spindle for hard-surfacing, the surface to be overlaid is first undercut 0.050 in. on a side (0.100 in. on diameter) to provide space for the overlay. The undercut area is then grit-blasted, using SAE No. 18 mesh angular steel grit to provide a good surface for proper mechanical bond of the alloy during the spray operation.

The grit-blasted spindle is then mounted in a lathe. While the spindle is rotated, the Colmonoy No. 6 hard-surfacing alloy is applied in powder form by means of the Sprayweld process to the surface most subject to wear. See Fig. 1.

As applied in this step in the process, the powder is mechanically bonded to the valve stem. This bond is similar to that obtained with the metallizing process. However, the Sprayweld process goes one step beyond mechanical bonding with a fusing operation which follows the spraying.

The next step is to fuse the mechanically bonded alloy to the base metal by applying the flame of an oxyacetylene torch as the spindle continues to rotate in the lathe, Fig. 2. The result is a fusion-bonded non-porous overlay which will not flake off in service.

After this, the hard-surfaced spindle is then transferred to a grinder where the overlay is ground to the finish OD dimension. The spindle is then ready for installation.

One important characteristic of this alloy has to do with its coefficient of friction. Any carefully ground and highly polished surface will generally have a low coefficient of friction. When put into service, however, normal wear usually brings about an increase in friction characteristics. Thus, what at one time was a low friction surface becomes, in effect, an abrasive surface that can actually contribute to wear.

This alloy, on the other hand, not only has a low coefficient of friction following the grinding operation, but also retains its friction-free characteristics as wear occurs. This contributes to reduce power requirements to impart motion to the hard-surfaced part, as well as to improved service life for mating components. **End**

HOW TO ELIMINATE ERRORS IN INDUSTRIAL DRAWINGS

Avoid expensive, time-consuming errors by setting down standard procedures for your plant engineering drafting department

By F. JOHN EGGERT, Mechanical Engineer, Hamburg, N. Y.

TO ASSURE efficient operation of a plant engineering department, it is necessary to measure and control a number of factors in drafting procedure to keep the cost of plant and equipment modification within bounds.

Attention, therefore, is directed to techniques which the plant engineer can apply immediately to forestall errors and reduce costs.

The accompanying sketches illustrate only a few of the classic shop and field situations that are generated by faulty drafting procedures. The situations in the sketches simply illustrate a type of error, and present no unusual problem in themselves. However, the effects of such inadequate drawing are legion.

Most mistakes never happened before, so a study of your everyday plant engineering drafting will highlight and prevent similar occurrences with only a little additional time and effort.

For instance, what safeguards preclude the possibility of either manufacturing or purchasing two different parts each bearing the same part number? There are several ways in which this error can occur.

Figure 1 is typical of the usual method of making a revision on a reproduced tracing. Except for the dimension change, it is impossible to determine whether a print was made from the original tracing or from the reproduced tracing. This simply amounts to having two different master tracings. It could have been prevented by publishing the rule that no revisions are to be made on a reproduction.

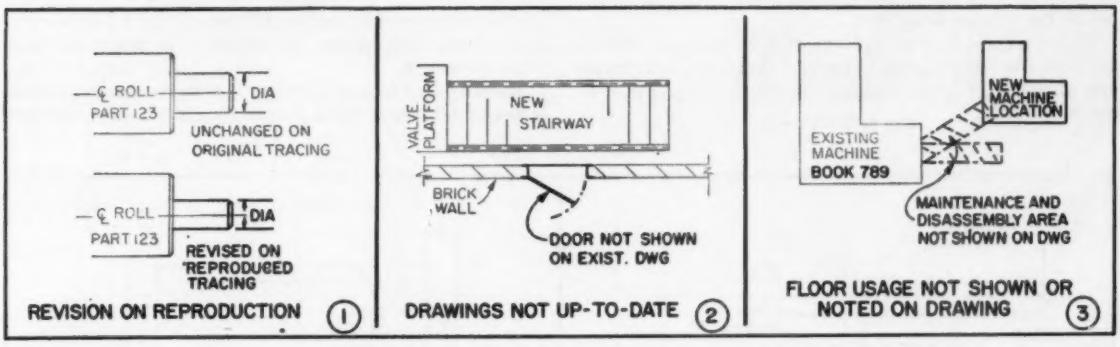
Structural interference between a new structure and an existing structure, shown in Fig. 2, is not unusual in that minor modifications are often accomplished without benefit of a drawing revision. This error can occur when there is no indication on the existing drawing that it is not up to date.

Recurrence of this error can be prevented by noting on the arrangement drawing that the area was reviewed for both shop alterations and proposed alterations in progress. In other words, the arrangement can change between the time the drawings are prepared for a modification and the time the material is fabricated and installed.

Good field reconnaissance must be developed to detect the potential mistake illustrated in Fig. 3. Assume that the maintenance and disassembly clearances were not shown on the drawing and the equipment manufacturer's maintenance books are gone with the wind. Such malpositioning of equipment is sometimes not discovered until they find it impossible to service the adjacent equipment during a future breakdown. This complicates matters.

Access to the equipment maintenance books is facilitated if the file code is noted directly on the shop drawing.

With the maintenance booklets of the existing equipment



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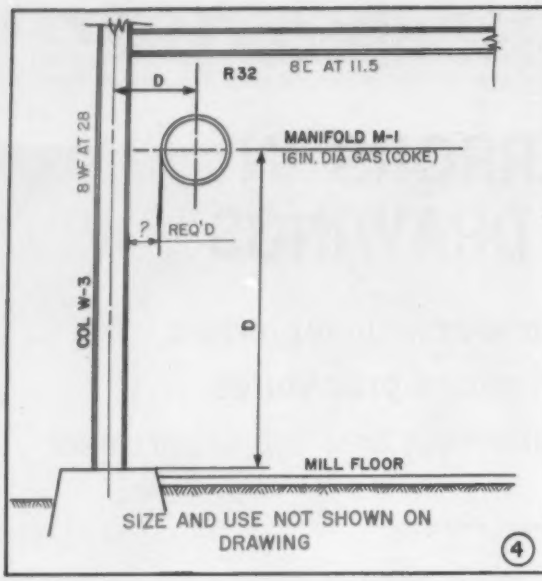
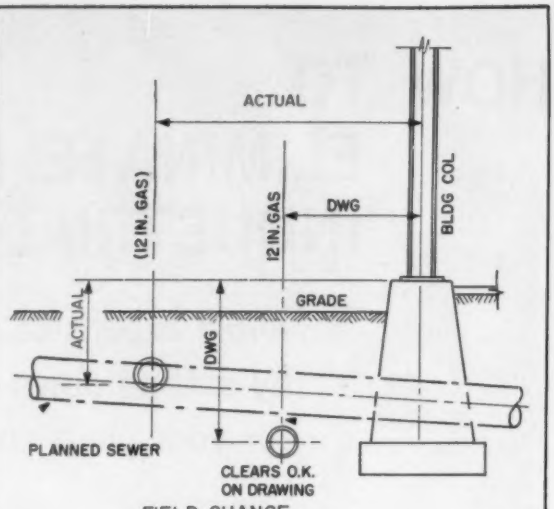


SIZE AND USE NOT SHOWN ON DRAWING

4



FIELD CHANGE NOT SHOWN ON DRAWING

5

available, new equipment can be positioned correctly on the layout the first time with correct allowances for maintenance, disassembly, stock lengths, etc. This is just another reason why it is difficult to consider all the facts since they are not shown on a drawing.

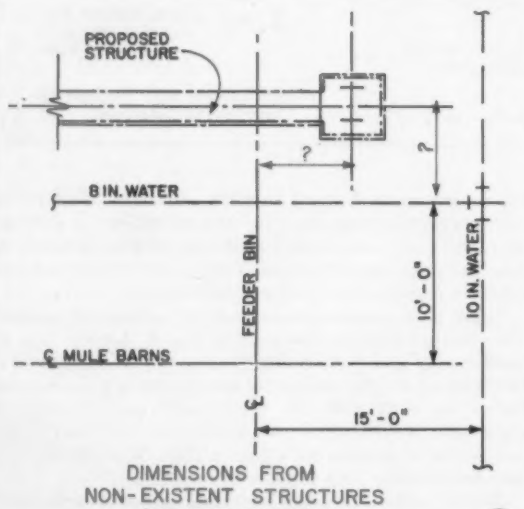
A drawing may be sufficiently complete to accomplish its purpose, but its value is reduced when further drawing searches are necessary to determine such ordinary features as structural sizes of adjacent items. In the example shown in Fig. 4, the column is identified but the structural steel size is not. Because of this, it will be necessary to obtain the erection diagram of the building to determine the number of the column detail sheet.

Without a doubt, the problem of field changes made in the past will always exist. Figure 5 illustrates how nicely one pipeline can clear another on the drawing, but alas, not in the field.

Adequate dimensioning includes positioning an installation in regard to the entire plant by a grid system. Figure 6 shows the dilemma created by the common practice of dimensioning solely from existing structures. The mule barns were a landmark of yesteryear, but they are gone now. The situation can also be confused when building names are used in lieu of building numbers. The hazard here is that the index system usually lists processes and buildings by name and thus old drawings may not be available, in case the names are changed.

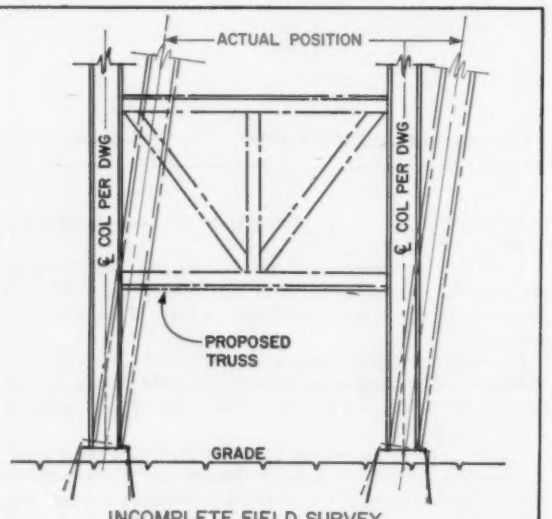
Other field changes occur due to wear, tear and time as shown in Fig. 7. Racking of building and crane columns is often developed by pulling strings of cars with the overhead crane. This makes for difficulty in fitting up additional steelwork.

Another area to watch are grade changes due to accumulation of fill which make the existing grade very different



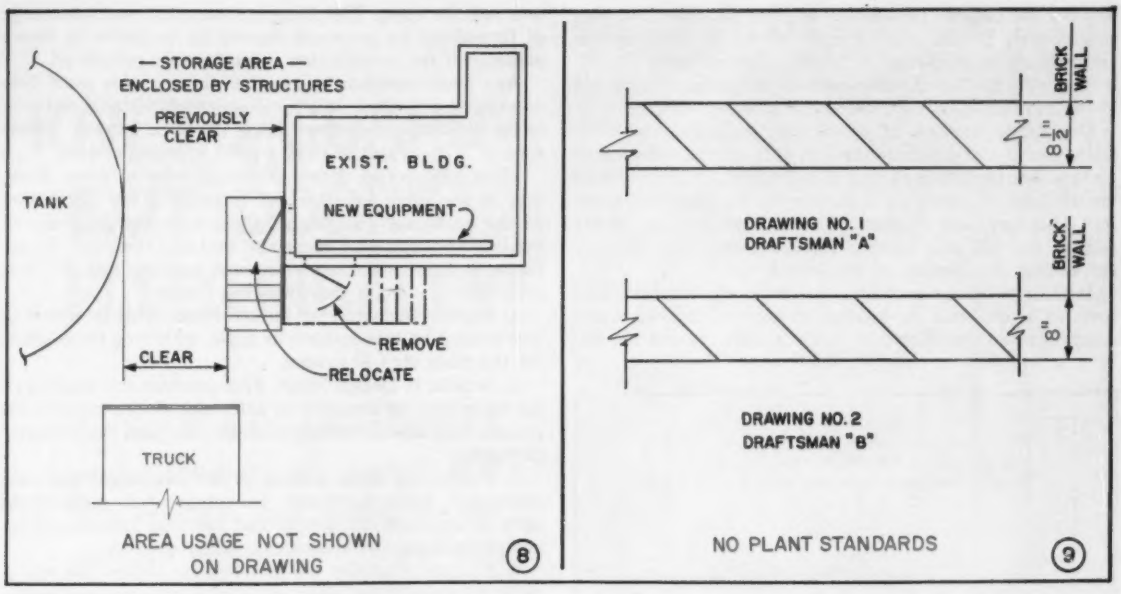
DIMENSIONS FROM NON-EXISTENT STRUCTURES (NO GRID SYSTEM)

6



INCOMPLETE FIELD SURVEY

7



from the original grade shown on the drawings. Of course, the grade can decrease due to water runoff. A good field survey before preparing the drawings would easily solve these problems.

Figure 8 again illustrates the point that even occasional usage of areas should be noted on arrangement drawings. In this case the real estate between buildings was of paramount importance as access to a seldom used storage area. Thus the relocation of a small item such as a stair affected the usefulness of a large area.

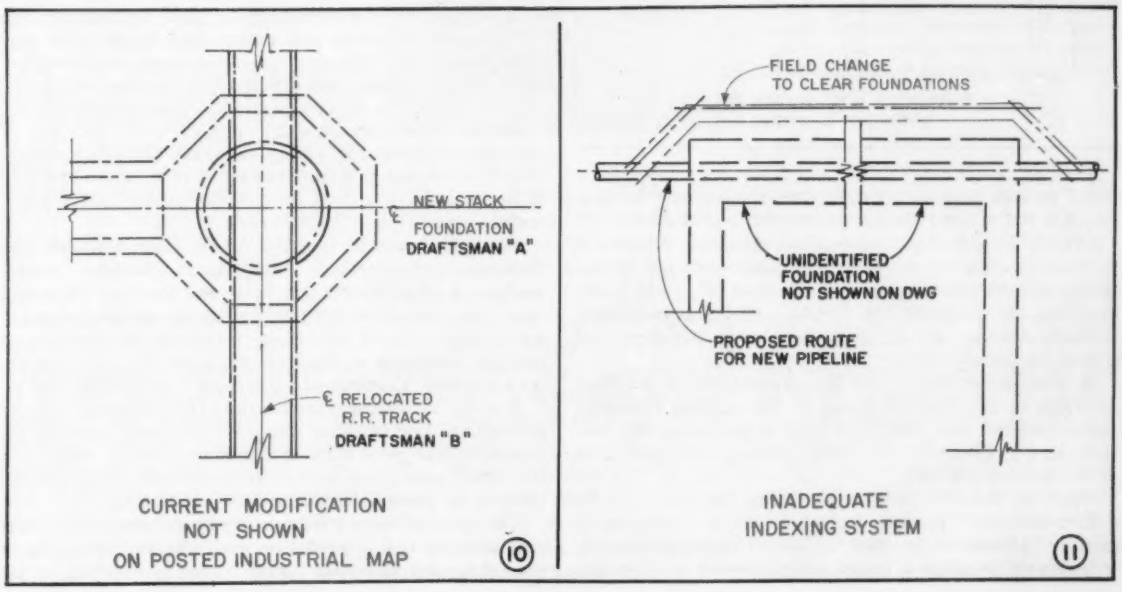
Figure 9 is only one example of how confusion develops due to lack of standards. In this case, it deals with the thickness of a brick wall. This, along with the effect shown in Fig. 11, due to an inadequate indexing system, are discussed further in this article.

Another case of physical interference which can develop, despite review of impending modifications in addition to existing facilities, is shown in Fig. 10. This error develops when current modification areas are not posted on an industrial map of your plant.

Draftsman "A" locates a new stack foundation, but difficulties arise when a temporary structure, say a railroad track, is found to occupy the site when excavation is scheduled. Draftsman "B" established the location of the track on a temporary basis due to other problems.

Do not overlook the possibility that a drawing can be too complete by showing installations that do not exist. Figure 12 illustrates how this develops and its effect. In this example a new line is to be connected into a non-existent line that did exist on the original drawing only. Thus all revisions and alterations must be shown on the original tracing in addition to supplemental tracings.

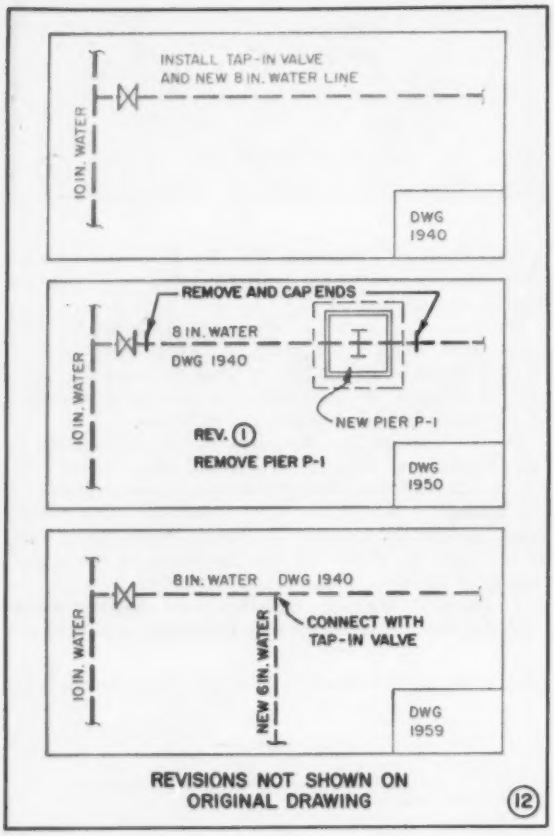
To the plant engineer, industrial plant drawings are an everyday tool. Not only do they present an organized pic-



ture for the original installation of plant facilities, but also continuously furnish x-ray insight into all the maintenance and production challenges that arise. Accordingly, the following step-by-step development of drawings should aid in the evaluation of your current drafting procedures.

One quick method of establishing a layout and forestalling errors of a plant alteration is to take a sequence of photos. Photos taken during construction and erection of the equipment should be indicated on the assembly drawing. This not only establishes a convenient index to the photos, but will also furnish cost reduction study material for similar installations in the future.

Detail layouts are necessary to resolve the structural features of a job, such as: loading, clearances, fieldwork and erection problems. However, such layouts are not the finished product and accordingly they should only be prepared to the extent required to establish a decision.



REVISIONS NOT SHOWN ON ORIGINAL DRAWING (12)

Once a decision has been reached regarding a layout it is good practice to require that those agreeing to the thoughts expressed should initial the print. This will freeze the plan, fix responsibility jointly and make everyone's decision definite and not contingent upon the degree of success of the alteration.

A time-saving feature for the preparation of the final drawings is the required listing of the existing drawings, maps, sketches and other data used in preparing this estimate layout. Obviously this ready reference will save a lot of the draftsman's time.

Applying the rule: "only to the extent required to make a firm decision," permits marked-up prints or photos of existing facilities to be used in lieu of elaborate layouts.

It is well to assign a layout series number to these layouts and file them. This filing has the additional advantage of furnishing the proposed feature for inclusion in future planning if the modification is temporarily postponed.

Any plant modification requires the use of a small bale of existing drawings. It is a recognized fact that a drawing in the file cannot be of use unless it can be located. Therefore, it is important to have a good indexing system.

Plant engineering drawings always refer to other drawings in the series necessary to accomplish the installation of the particular equipment, along with the drawings of existing adjacent equipment and building structure. In addition to these customary references you will find that it is practical to include the following items:

1. Layout Drawings of Future Plans. This is useful to determine how this equipment aligns with long range plans for the plant area or system.

2. Structural Design Sheet. This provides the analysis of the equipment or structure to determine future capacity increases and aids in solving maintenance and performance problems.

3. Purchasing Data. Listing of the equipment and subcontracted work facilitates procurement of replacement parts or duplicate equipment and can also assist in checking performance in accordance with warranty.

4. Account Numbers. To affix charges against this equipment for installation, inspection, maintenance and operation.

5. Bills of Material. Useful in identifying the construction materials earmarked and the source of supply.

6. Industrial Plant Maps. New equipment or modifications should be added to keep the maps up-to-date.

7. Codes (Construction and Industrial). Should be on file, along with plant safety rules which apply.

8. Photos. Useful in future modifications and planning construction for similar installations.

9. Routing and Quantity. Specify the number of copies for each department concerned.

A meeting of the right people to establish and standardize the physical properties and design data for any plant is time well spent. During the discussion regarding design phases, it will be worthwhile to establish a system confirming the date on which the cost of a modification has been amortized by the increase in production or maintenance reduction. This type of data is often useful to the plant engineering department in stimulating additional capital expenditures.

In some plants it is customary for each draftsman to use the physical properties and design data listed in his personal handbooks. Not only does this create confusion between the boardman and the drawing checker, but it can also be the source of expensively designed structures.

Unit costs of completed drawings vary with the type of drawing (architectural, piping diagrams, steelwork details, etc.), but the cost of a complete set of prints should be held to approximately 10 per cent of the capital outlay for a routine type of plant modification.

Much time can be saved if rubber stamps are used to illustrate such common standards as bushings, special washers, hooked foundation bolts and the like. They will also save time when used for stamping standard drawing notes and piecemark title blocks for details. Rubber stamps are also adaptable to illustrate the plant location diagram on a drawing. Location of equipment is merely blocked in.

A study to eliminate useless data from drawings will be productive. For instance, using welding code symbols on non-structural parts such as handrails is easily eliminated by merely specifying welded assembly and noting specific parts to be furnished loose and welded in field.

The value of these standards can be enhanced if the current cost per unit is posted on each standard as an aid in preparing cost estimates. **End**

HOW TO GUARD EXIT DOORS ELECTRICALLY

Costing less than four months' wages for a guard, control system enables one guard to supervise five plant doors. Job previously took three guards.

By **WALTER JACOBY, Maintenance Supt., S. P. D. I-T-E Circuit Breaker Company, Philadelphia, Pa.**

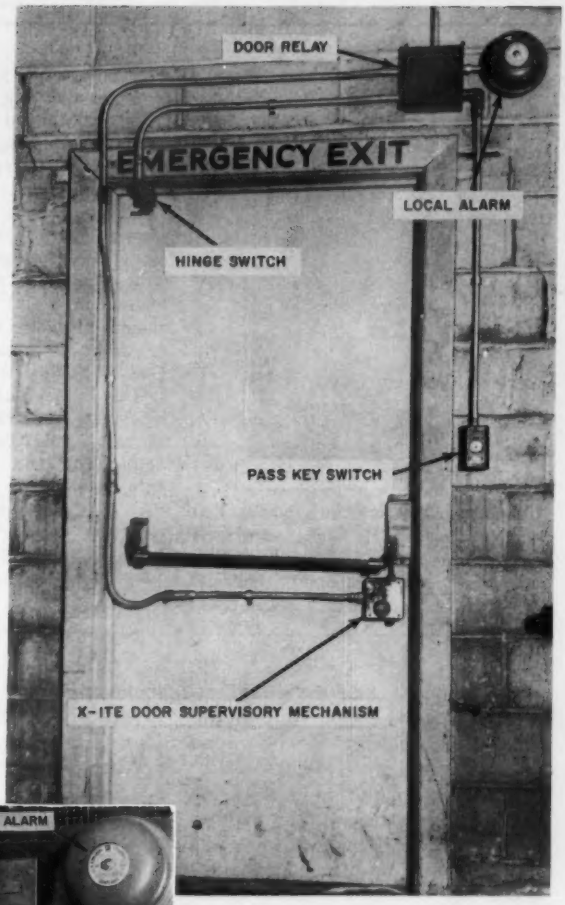


Fig. 1. Electrical devices monitor unauthorized use of emergency exit door. Tamper switches built into mechanism detects any attempt to by-pass system.

Fig. 2. Control panel, mounted in guardroom, indicates conditions at all doors. Alarm gives instant warning of opened door or attempt to void alarm system.

PLANT SECURITY COSTS can be substantially reduced with this electrical supervisory control system that can be easily installed to protect emergency exit doors. National Fire Code regulations forbid the installation of ordinary locks on these exits but this system offers a definite increase in security coverage with a minimum of manpower and little effort required to keep it in operation.

On this particular application, covering the supervision of five widely separated doors, the cost of installation amounted to the wages normally paid to one guard for four months. In return, the system enables one guard to supervise all the doors in this building, a job that previously required three guards.

Meeting all security and National Fire Code regulations, the system is tamper-proof, fail-safe, requires no effort to operate and affords flexibility in the distribution of the watchman force. Complicated reset motions such as glass window replacement, resetting switch latches manually and rewinding spring-loaded local alarms have all been eliminated by the use of a reset key.

The basic mechanism consists of a standard FS condulet box in which switches, cams, pushrods and springs are mounted. This unit, Fig. 1, is mounted on the door just beneath the emergency latch mechanism. X-ite is the trade name for the system derived from the word "exit" and the I-T-E trademark. A patent application has been filed on this development.

In addition to this device, each door is equipped with a hinge switch, pass key switch, door relay and local alarm. Connections are made from each door to a central location where a guard is stationed at all times.

Supervision of the doors is accomplished with the equipment shown in Fig. 2. Red pilot lights monitor each door, a master relay is mounted in the cabinet to detect any change in the door circuits, and an alarm is mounted above the unit to warn the guard that a door has been opened.

An alarm cutout switch is provided to silence the alarm while investigating the source of trouble. A white pilot light tells when this alarm cutout switch is in the cut-

restored the loads are automatically

About the Author

Born in Kinston, Pennsylvania, December 16, 1923, Walter Jacoby's academic training and work experience both center around electrical engineering. A graduate of Girard College, majoring in electricity, Mr. Jacoby completed the course in electrical engineering given by the International Correspondence Schools, Scranton, Pa., in 1944. Starting with I-T-E as a serviceman in 1942, he worked his way through the jobs of plant electrician, electrical maintenance foreman, general foreman of maintenance and in June, 1957 was placed in charge of maintenance and construction at the Special Products Div. as maintenance superintendent.

This is the fourth article to appear in PLANT ENGINEERING authored by Walter Jacoby. Previous articles were "How To Bend Electrical Conduit", July, 1958, page 110, "How to Stop Welding Gas Waste", September, 1958, page 123, and "Reclaiming Process Water Cuts Bills 50 Per Cent at I-T-E", February, 1959, page 92.

out position so that the guard remembers to restore the alarm circuit after closing the door and resetting the door switch.

To gain a better understanding of how this security system operates let us take a look inside the X-ite unit mounted on the door underneath the emergency latch mechanism. Referring to Fig. 3-A, a spring-loaded pushrod is held down by the emergency door latch mechanism. This in turn holds the contacts of the door switch closed. When the door is opened, the push rod moves up and opens the door switch contacts. The housing also contains two tamper switches to detect any effort to bypass the alarm system and a key-reset switch mounted on the cover, Fig. 3-C, to permit the guard to reset the system after it has been tripped.

When the alarm sounds, the guard silences the bell with the alarm cutout switch and snaps a padlock on the guardhouse door, Fig. 4, prior to making his investigation. The hasp and lock secures the guardhouse door in his absence as this door is not supervised electrically. This is the only authorized entrance and exit for plant personnel and is monitored continuously by the guard except when making his rounds or investigating unauthorized use of other exit doors.

In the schematic diagram, Fig. 5, all of the devices inside of the colored boxes are mounted in the guardroom. The schematic circuit, as shown, has been simplified to the components and circuitry involved in protecting only one exit door. All the components outside the colored boxes are mounted at the door and a complete set of these will be needed for each additional emergency exit door supervised.

Not all doors will need the local alarm devices shown. This is particularly true of the main office doors which are normally locked on the second and third shift. These can be supervised by installing hinge switches on the doors. A pilot light on the guardroom panel tells the position of these doors at all times. A cutout switch is provided to bypass these hinge switches when the receptionist is on duty.

The alarm system operates on 24 volts, 60 cycle, a-c current but could be designed around 24 volt d-c components by using either a copper oxide or selenium rectifier. If d-c voltage is used, transfer relays can be used to transfer the alarm system from the normal power supply to the 24 volt d-c system furnished by the telephone company in the event of a power failure. Naturally, you should discuss this with your local telephone company and obtain clearance for these connections prior to designing for this voltage.

If the supervised area has an emergency generator, 24 volts a-c can be provided through the transformer connected to the emergency lighting circuit. In our system, emergency generators start and automatically transfer emergency loads and no loss of protection occurs. When the normal power supply is

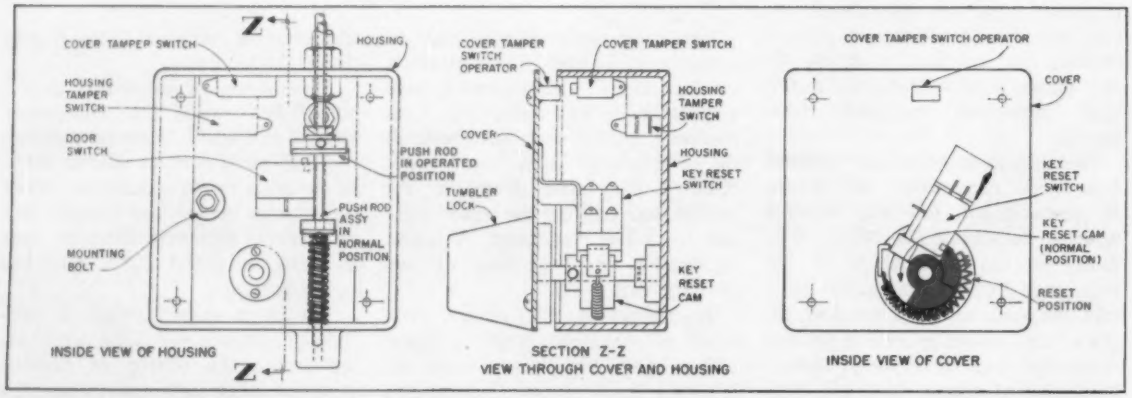


Fig. 3. Heart of the security system is this X-ite door supervisory mechanism shown in both safe and operated positions.

restored the loads are automatically transferred to their original circuits and the generators shut down.

Tracing through the schematic diagram, Fig. 5, we see that the first circuit operates the guardroom alarm. The alarm cut-out switch is shown in the alarm position, wires 1 and 3. Relay contact CR-1, wires 3 and 4, is a normally closed contact held open when relay CR-1 is energized. This relay remains energized as long as all door, hinge and tamper switches are closed.

When a door is opened, door switch, wires 7 and 8, opens de-energizing relay CR-1, wires 10 and 11. This opens the held-closed contact CR-1, wires 11 and 2 and the relay remains de-energized even if the door is re-closed.

Held-open contact CR-1, wires 3 and 4, closes when relay CR-1 is de-energized and completes the circuit to the guard room alarm, wires 4 and 2. The alarm can be silenced by transferring the alarm cutout switch to the bypass position, wires 1 and 5. This turns off the alarm in the guard room and illuminates the alarm cutout pilot light, wires 5 and 2.

When the door is opened, door switch, wires 13 and 14, in the local alarm circuit opens de-energizing the door relay DR. Held-open contact DR, wires 16 and 2, closes sounding the local alarm, wires 13 and 16. Held-closed contact DR, wires 15 and 2, opens and the alarm will continue to ring even if the door is closed again.

The door pilot light, wires 14 and 15, mounted in the guard room is de-energized when the door opens. When the alarm sounds the guard checks the lights to see which one went "off" to determine which door has been opened. If the guard is making his rounds when the alarm sounds, he can tell which door has been opened by the sound of the local alarm.

Fig. 4. Guard snaps padlock on guardroom door before investigating alarm.

After closing the door, the guard resets the alarm system by inserting a special key in the reset switch, wires 11 and 2 and 15 and 2. Closing this switch energizes both relays CR-1 and DR. Contacts CR-1, wires 11 and 2 and DR, wires 15 and 2, close to maintain the relays in the energized position when the reset key is removed. The alarm can only be reset at the door, forcing the guard to investigate.

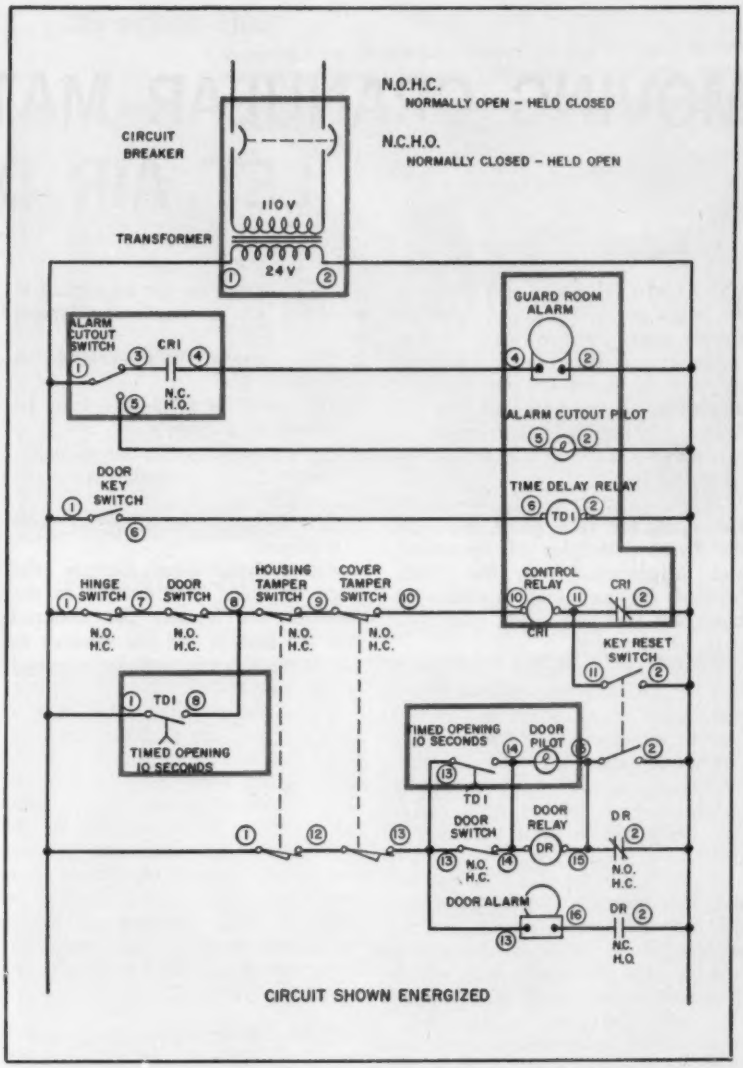


Fig. 5. How devices are connected to protect one emergency exit door. All electrical equipment within the colored outlines is mounted in the guardroom panel.

A door key switch, wires 1 and 6, is provided to permit authorized personnel to use these exits without sounding an alarm. When this switch is closed, a circuit is completed to a time delay relay TD-1, wires 6 and 2. TD-1 contacts, wires 1 and 8, and wires 13 and 14, close to by-pass the hinge and door switches.

These time delay contacts remain closed for ten seconds after the key is removed to permit opening and closing the door. If the door is not closed at the expiration of the ten second interval, the alarm will sound. To control the flow of traffic only certain doors are equipped with key switches. **End**

MOVING GRANULAR MATERIALS? LET AIR DO THE WORK

PNEUMATIC CONVEYING systems are being called upon to handle many different types of materials in industrial plants. They can be used to move or remove bulk materials, such as dust, sugar, beans, cranberries and flour under carefully controlled conditions of feed and speed.

If you are considering pneumatic conveying for your plant, here are the basic principles of operation, and suggestions from the Compressed Air and Gas Institute on how best you can adapt such systems to your use.

In general, there are three basic systems for carrying material by air movement: (1) conveying by air above atmospheric pressure; (2) conveying below atmospheric pressure (suction); and (3) conveying by a combination of air both above and below atmospheric pressure at different points in the system.

Type 1 may be classified further into low pressure systems for moving materials such as wool, cotton, chopped straw, paper clippings, etc., and the high pressure systems which transport dense materials such as dry sand, coal, etc.

The chief distinction between the different systems that operate in class 2 is in the size of lines and nature of the material moved. Large centrifugal fans are used with large diameter pipes to dispose of waste materials like sawdust, smoke, vapors and dust. In this type, the materials pass through the fan. A second type of suction system uses a reciprocating exhauster in place of the fan. This machine produces strong currents of air that move heavy particles which could not pass through a fan.

Finally, in the classifications of air conveying systems we have the so called "induction systems." In this type, a compressed air injector is used to produce a partial vacuum on the inlet end of the system and a pressure at the other end. The system can be adapted to many systems that are not suited to the other types, since the air lock of the suction system is eliminated.

The factors that are important in designing an air conveying system are:

1. The nature of the material to be handled.
2. The quantity of material to be moved in a given time.
3. The range of size of the particles.
4. Distance the material is to be carried.
5. Condition of the material after transport.

Along with these factors, the plant engineer is interested in the methods for feeding the material into the system and the manner in which the particles will be received at the exit end.

If the basic system selected is a suction type, the problem narrows down to selecting equipment (in addition to the connecting piping) for these functions: an air pump, a suction nozzle, a discharger and an air filter. The pressure type also has the four basic components except that the nature of the inlet and outlet is different. Let us review the basic equipment involved to develop a better concept of the possibilities in pneumatic conveying.

Prime Mover—One of the principal considerations for pumps used in pneumatic systems is that a large quantity of air should be moved. It is not necessary or desirable to create a high vacuum. In general, reciprocating pumps are reliable and often used, but the multi-stage turbine type of blower or exhauster also has many applications.

If the material that is transported has abrasive characteristics, it is important to thoroughly filter the air passing through the pumps. The oil used to lubricate the pumps picks up the tiny abrasive particles and forms a mixture which will quickly score and damage the walls of the cylinders.

Air Filters—There are several types of air filters—"cyclone" separators, bag filters, and wet filters.

The cyclone type is frequently mounted inside the receiver for the material conveyed. It is made of an inverted cone, with the air and its burden entering at the top. The heavy material circulates inside and gradually falls to the bottom. It is discharged into suitable containers. The unit is a good separator and can be considered as self-cleaning. It does not sort out the finest particles.

Bag filters are made from closely woven fabrics. The air passes through the fabric and deposits its burden. After dust accumulates, the bag is cleaned.

Receivers—The filters are often located at the receiver, which is either a storage point or the beginning of the process that will use the material. At the receiver, the conveyed material is separated from the air. Generally one of two basic methods is used:

1. The air loses its velocity and the materials drop to the base of the receiver.
2. Air-entrained fines are collected in an integral dust collector, and shaken down periodically into the base.

Most effective systems use a combination of both methods.

Intake Units—The materials to be conveyed must be placed in the air system. This is accomplished with nozzles, hoppers or injectors. Each type is suited to certain classes of materials.

Nozzles are used for unloading boxcars, trucks, barges and similar bulk carriers. The nozzle is normally attached to the fixed conveying line with a flexible hose. Supplementary air inlets produce the correct mixture of air and materials at the intake point.

Materials are often fed into a hopper which has a suction line at the bottom. This eliminates any chance of spilling or wasting material. Bag dump hoppers have been designed as a quick and dust-free means of introducing bulk materials from bags into a suction type system. A knife edge on the hopper tray slits the bags and its contents are drawn into the line.

Pressure systems use injectors to place the material in the air stream.

FOR YOU . . .

The material drops into a passageway that leads into the moving air stream. It picks up the materials and moves them to the desired destinations.

Locks and Valves—These mechanisms are located at critical points throughout the system to control air and particle movement. They include the discharge locks, cutoff valves and cutoff gates.

The discharge lock controls the flow of material from the receiving hopper to a chute, bin or process. It is designed to stop a backflow of air from the atmosphere. Two types are in common use—rotary and gate.

Rotary locks are used for nonabrasive materials. A rotor, containing four or more compartments, passes solids against either a high or low pressure differential. Gate locks are used with abrasive materials. The three sets of gates are perfectly synchronized. One set of gates is always closed to prevent any backflow of air.

Air flow is controlled by cutoff valves. These valves are available for manual, air or motor operation. Effective valves must have a positive action even with a vacuum on the line. The widest use of these valves is in branched systems where it is necessary to switch movement from line to line.

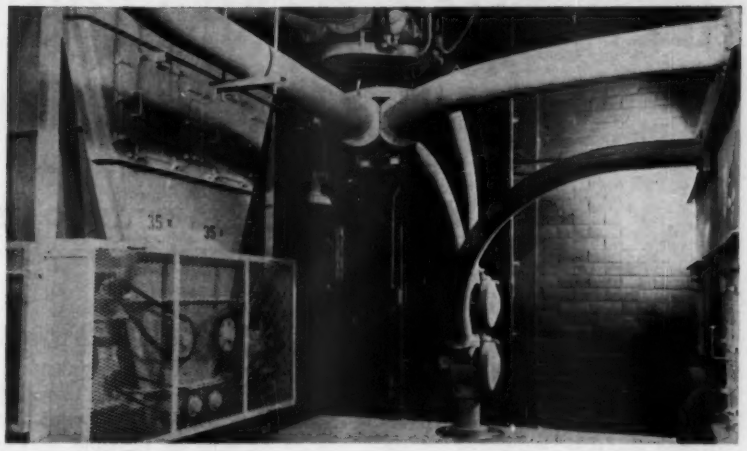
Cutoff gates start and stop material flow from vertical discharge chutes or hoppers. To eliminate leakage, the device must close without clogging. Self-cleaning gates are available, assuring dust-free operation and long life.

Conveying Lines—All of these units are connected by conveying lines. Selection of piping material depends on such things as abrasion resistance, corrosion resistance, and the length of travel.

Depending on the plant requirements, they are placed in out-of-the-way locations or buried. Generally, the wear is negligible on the straight sections. Bends are made with special designs to minimize wear. **End**

. . . Conveying Flour

Conveying lines sweep into storage area at National Biscuit Company's Chicago bakery. Lines move flour and sugar.



. . . Removing Dust

Ducts, leading from each of the grinders, direct steel and other abrasive dust away from machines and operators.

. . . Transferring Cranberries

Intake units can be designed to suit special product. In this case, frozen cranberries are transferred from freezer.

KEEP THAT STAINLESS CLEAN!

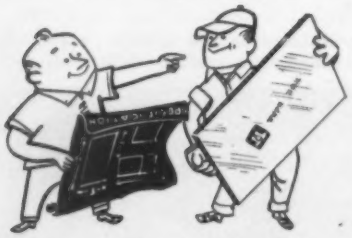
1. What causes discoloration and how to prevent it through proper design and usage

2. What cleaning agents to use and how to use them most effectively

STAINLESS STEEL is often selected for its low-cost, easy cleaning characteristics as well as for strength or corrosion and heat resistance. Because cleaning of vessels, tanks, pipes and equipment cannot easily be mechanized and is an expensive hand operation, ease of cleaning means lower labor costs. Quick and complete cleaning permits the use of a single stainless vessel for processing many different materials without danger of product contamination. Stainless steel is used almost exclusively in atomic energy work because radioactive materials can be so easily and completely removed. Stainless offers cleanability comparable to glass and ceramics.

Here are some rules from the Stainless and Strip Division of Jones & Laughlin Steel Corporation for the maintenance of optimum cleanliness of stainless at low cost:

Not all stainless steels are the same. Of the 39 standard types commercially available today, there is a difference in their resistance to corrosion from common chemicals and foods. Pick the type best suited to handling your materials, temperatures and processes to avoid any possibility of pitting and subsequent difficulty in cleaning. If you receive more than one type of stainless steel in a single shipment, be sure the proper type is used.



The higher mill finishes are usually protected during shipment by a paper, plastic or other covering as specified. Retain the protective coating as long as possible during fabrication and erection. If the covering must be removed, avoid scratching. Workers should avoid walking on the material. Avoid marring with steel tools. Scratches left unpolished may lead to pitting during service if corrosion conditions are severe. Stainless should be kept free of any foreign matter during fabrication. When the protective covering is removed, see that it is removed completely.

Bacteria or particles of product in processing equipment can lodge and build up in crevices making complete cleaning a difficult task. Vessels, tanks and other processing equipment should be designed with smooth joints and round corners. If a corner cannot be formed and must be joined, rounding out the corner with a fillet of weld metal will provide for easier cleaning.

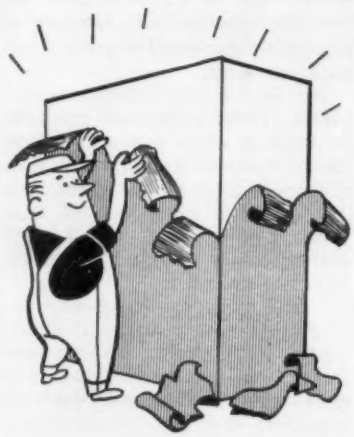
Other materials such as wood for platforms or galvanized steel for legs are sometimes used on stainless equipment. However, the use of any other material in combination with stainless should be carefully considered and designed. Carbon steel in contact with stainless will rust. Wood will absorb liquids from spillovers and, in contact with the stainless, pitting may develop.

It is a good rule to always use stainless steel fasteners of the same type as the equipment. Carbon steel nuts and bolts even though coated or plated will frequently rust in contact with stainless if any moisture is present. Materials that will not attack stainless will corrode ordinary steel bolts causing eventual failure. Design to avoid localized heating or over-heating. "Heat-tint" or discoloration is time-consuming to remove.

When stainless steel products are used in conjunction with electrical equipment they should be grounded to prevent stray currents from causing galvanic action.

When gaskets or packing are required, avoid graphitic types which tend to accelerate corrosion and pitting. Asbestos, nylon and other materials are available, which are satisfactory.

Be sure that all welds are smooth, that all undesirable scratches have been removed, that all traces of the protective covering and adhesive have been taken off prior to final finishing and that all aids to fabrication have been removed. Depending on the services and materials to be processed or stored, the final finish can be applied.



It is commonly believed that a higher finish is easier to clean and more corrosion resistant. As yet there is no real proof of this. On the other hand, there is evidence to the

CLEANING AGENTS FOR STAINLESS STEEL

WHAT TO USE	HOW TO USE IT	FINISH EFFECT
I. To remove adherent deposits of oil, grease, weather stains, dyes and light discolorations:		
Lac-O-Nu	Rub with damp cloth	Removes fingerprints, light soil. Light film left on surface will help prevent fingerprinting
Soap and water	Rub with damp cloth	Removes ordinary grease, dirt, water spots. Dry after rinsing. Will not scratch
Ammonia and water	Rub with damp cloth	Excellent for grease removal in commercial installations. Will not scratch
Household cleaners	Rub with damp cloth	Will scratch No. 4 finish slightly
Grade FFF Italian pumice, Whiting	Rub with damp cloth	Satisfactory for all finishes. Rub lightly on No. 7 finish
Grade F Italian pumice	Rub with damp cloth	Will scratch No. 4 finish slightly
Liquid NuSteel	Rub with dry cloth	Satisfactory for all finishes with light pressures
Cooper's stainless steel cleaner	Rub with damp cloth	Satisfactory for No. 4 finish
Allen stainless steel polish	Rub with damp cloth	Scratches considerably but leaves mirror reflection
II. To remove heat tint or heavy discoloration:		
Allen stainless steel polish	Small amount on damp cloth	Excellent heat tint remover
Birdsall's "Staybright"	Rub with damp cloth	Very good for heat tint removal. Does not scratch No. 4 finish but does scratch No. 7
Stainless steel wool	Rub with or without cleanser	Scratches but leaves mirror reflection
Ajax, Comet, Bab-O, etc.	Rub with damp cloth	Good for heat tint removal. Scratches No. 4 finish slightly
NuSteel or Temp	Rub with damp cloth	Good for heat tint removal
Five per cent oxalic acid (use warm) or 5.15 per cent nitric acid	Swab or immerse. Always follow with a 5 per cent sodium carbonate neutralizer rinse	Good for discoloration
III. To remove oils and grease deposits with organic solvents:		
Carbon-tetrachloride, naphtha, trichlorethylene, acetone, kerosene, ether, alcohol, benzene, perchlorethylene	Small amount on cloth	No effect on finish. Take all precautions against fire. Protect hands and body against contact with solutions. Avoid breathing fumes
IV. To remove grease, oil and fatty acids, where mechanical action is not practical:		
5-15 per cent caustic soda (hot or cold)	Solution flows through pipes, vessels and tanks in system. Rinse with plain water to remove solution	All excellent removers of grease, oil and milkstone

NOTES: Keep cleaning simple and easy. Rub lightly using the minimum amount of pressure and cleaner that does the job. Stainless steel is not hard to clean or to keep clean. Always rub in direction of polishing lines.

Ordinary steel wool or steel brushes should not be used on stainless steel surfaces. Particles of steel may become imbedded in the stainless steel surface, and rusting of these particles will eventually appear as stains. Use stainless steel wool or sponge on stainless steel equipment. If stainless steel wool is not available, use ordinary steel wool but clean with household cleanser to remove steel particles.

A fibrous Oakite material, may be used in place of metal sponges or cloth pads for applying cleansers and polishes. This material is effective in aiding in the removal of milkstone.

For heavy hard water deposits. 15-20 per cent (by volume) nitric acid is very efficient. Acid treatment should be followed by a thorough water rinse.

The action of soldering fluxes should be neutralized immediately with a 5 per cent sodium carbonate solution.

effect that stainless steel parts, even after severe use during which the surface has become scratched, still retain virtually the same cleanability as when new.

In one series of experiments conducted on a scientific basis using radioactive tracer isotopes, it was found that surface condition had little effect on cleanability. Further studies are now underway, particularly in the dairy industry, to determine the exact relationship between surface finish and cleanability.

When specifying steel for equipment which must have good cleanability, it is most economical to use the lowest possible finish. As a rule of thumb, the finish should be specified on the basis of appearance desired or an essential factor such as the flowability of a particular product over the surface of the metal, rather than an assumed relative cleanability.

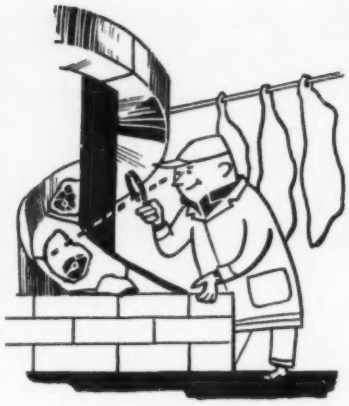
Stainless steel equipment should be cleaned regularly as required. For many applications, cleaning with hot water and soap, detergent or ammonia is sufficient. Ordinary washing should be followed by a fresh water rinse to remove traces of the cleaning solution. Decorative surfaces should be wiped dry to eliminate spotting.

Processing equipment should be checked frequently for the formation of deposits. The sooner a deposit is removed, the less chance there is of local pitting caused by a lack of oxygen. If solutions are not effective, deposits should be removed at once with the finest abrasive that will do the job. Coarse scouring powders will scratch. Use stainless steel wool, if necessary, but not regular steel wool. Iron particles from ordinary steel wool can become embedded in the surface and later rust. If stainless steel wool or sponges are not available and ordinary steel wool must be used, follow the steel wool cleaning with one of the household cleaners. This will help remove any loose iron particles.

Discoloration caused by heat can be removed with stainless steel wool or a fine abrasive.

Pay particular attention during cleaning to the surfaces around washers and gaskets.

One of the most attractive characteristics of stainless is its resistance to cleaning and disinfecting solutions. It will resist many cleaning compounds, both acidic and alkaline. At times both are needed in the same system to remove harmful particles.



Halogen compounds such as those of chlorine will attack stainless if continuously exposed for more than two hours. However, such solutions are often prescribed by sanitary codes as a disinfectant. Speed is essential in using chlorine disinfectants. A thorough rinsing should follow immediately after their use.

Do not paint, varnish or lacquer stainless as an aid to cleanliness. Stainless will resist corrosion and pitting better without "protective" coatings.

When stainless equipment is to be idle for any length of time, clean with extra care. Be sure that all deposits are removed. Be sure the system is thoroughly flushed out with water, and that no product or cleaning solution remains. If possible, dry out the system so that even water accumulations are removed. Water absorbs particles from the air, forming solutions that may pit. **End**

Why Does Stainless Steel Resist Corrosion?

Stainless steel is the name given any iron-chromium alloy which contains at least 11.5 per cent chromium. Most standard grades contain more than this, as well as nickel and other alloying elements such as molybdenum, manganese, etc. Chromium imparts the basic corrosion resistance of the metal.

Current theory is that the stainless alloys form a thin, transparent and very tough oxide film which is passive—that is, practically inert. As wear or abuse causes damage to the surface, this film automatically restores itself on the new surface, provided oxygen is present.

For this reason then, stainless offers outstanding resistance to corrosion by oxidizing solutions and heated air. For the same reason it offers considerably less corrosion resistance to reducing solutions or in conditions where the surface is seldom cleaned and oxygen-less deposits are allowed to accumulate.

Fig. 1. Fifteen people can sit comfortably in mobile training unit to watch demonstrations on lubrication systems.

LUBE SCHOOL ON WHEELS

Classroom Goes to Plant Doors

EVERY LUBRICATING system used in U. S. Steel Corporation plants can be demonstrated in detail to give employees theoretical knowledge and practical job know-how in proper maintenance of plant lubricating equipment.

The demonstrations are given in a classroom housed in a 35-ft mobile training unit, equipped with all the components of a centralized lubrication system.

The training director at each plant is responsible for his own program and when the assistance of the traveling classroom is requested, a proposed lubrication training program must be submitted.

Built by the National Tube Div. of U. S. Steel, the classroom has a specially constructed steel body, seating up to 15 people during demonstrations. Along both walls are removable panels upon which are mounted operating lubricating system components. These can be plugged into a built-in lubrication reservoir for "live" demonstrations with lubricating materials. Work benches are located at each end of this area. **End**

Fig. 2. Engineer, using training manual, demonstrates grease manifolds on stainless-topped bench in classroom.

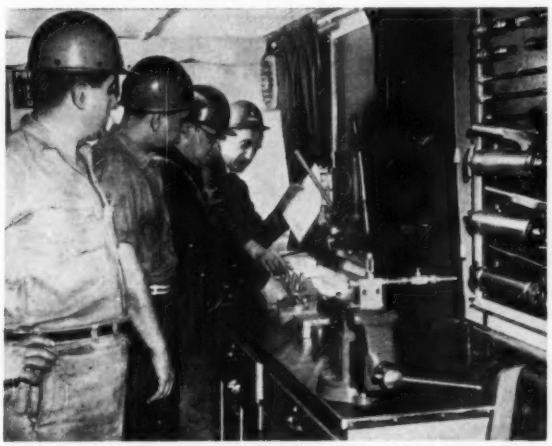


Fig. 3. Lubrication practice manual was developed for use in company plants, is used in classroom demonstrations.

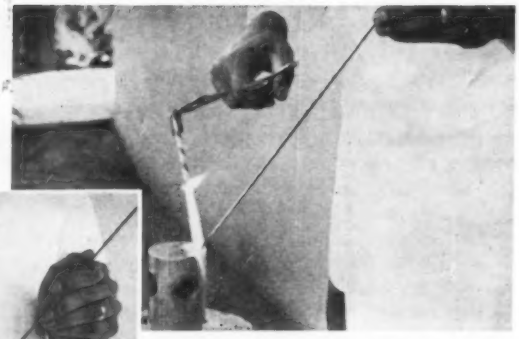
New Maintenance Tool— ROCKET POWER for...

WELDING
LIFTING
EXTINGUISHING
DEMOLISHING

OUT-OF-THIS-WORLD power —rocket power—is being groomed as a new tool for industrial plant maintenance.

● Already developed is a rocket-fueled "wand" that hurls a malt-thick borate solution upwards of 40 ft to extinguish stubborn chemical fires. Man-packed, the extinguisher consists of a sturdy 28-in. long, 4-in. diameter cardboard tube. Loaded with flame-smothering borate, it is fired by a propellant pill —a small capsule of solid rocket propellant which pressures the tube, dousing hard-to-get-at fires.

Which hand holds the rocket-fueled torch? Answer: The one that's holding the striped object—a less-than-a-dollar item.



Above: Here's the torch in action. No bigger than a soda straw, this plastic-covered rod will lay a couple of inches of weld bead with its 4000 F flame.

● Designed—and already "on the shelf"—are prime mover rockets which can roll to dockside the heaviest laden of plant-bound freight cars. The rocket-fueled device replaces wheelbars or more mechanized car-rolling apparatus.

● For quick-welding, either in air or water, plant engineers will soon have a rocket-fueled welding torch . . . really nothing more than a plastic "soda straw" packed with ammonium nitrate and synthetic rubber (the same fuel that propels many a space bound rocket). Simple though the device is, it attains temperatures to 4000 F and, in burning an incandescent 1½ minutes, lays considerable bead. Prime applications: for low-cost emergency welding, as in pipelines, water tanks or where conventional welding machines aren't available.

● Developed for the U. S. Maritime Service, but applicable to plants everywhere, is a line-laying rocket gun that flings a line upwards of a mile. In plant application, the device might lay communications lines or help string support cables to process towers and structures.

● Perhaps most spectacular is what might be called "the maintenance man's aerial ladder"—a harness which, rigged with two rockets and worn by plant maintainers, will actually boost a man to a plant's highest structure, be it a flagpole, a building's roof or pole-hung trans-

former. The device, called Aeropak, has just been "flight tested" by its developers, the Aerojet General Corp. Originally intended to carry field troops over rivers and valleys in true Buck Rogers fashion, the "flying suit" has many plant applications. In fact, it is already being investigated by construction outfits which must often boost workers to inaccessible places.

● Another rocket-oddity sure to find its way into the nation's plants is the "demolition rocket"—a rocket designed to push a building's walls inward, rather than allow them to fall outward, during a tear-down operation.

Sounds like a rocketeer's dream? Well, it isn't. For rocket tools are fast shaping-up on the nation's proving grounds.

For Materials Handling

Among "tools" in the works are rocket brakes—small, inexpensive retro rockets which, installed beneath a truck's front axle, brake the vehicle in an emergency. Many mills and process plants roading trucks over dangerous runs (especially in hilly terrain) are seriously considering installation of rocket brakes. In essence: the brakes are designed with thrust enough to overcome any runaway load, stopping or slowing the vehicle should its regular brakes fail.

Well past design stage is another rocket-powered firefighter . . . ideal for the plant, especially suburban, located in fire-prone terrain. The self-firing firefighter is armed with a heat-seeking infrared head—which unerringly homes on the flames. Loaded with special extinguishing agent, the device may turn plant fire warden . . . watching the premises after shift . . . and automatically homing on even the smallest of fires.

Peaceful Rockets

All of these spanking-new devices, of course are "peaceful" outgrowths of the nation's rocket and missile programs.

"Their application to industry," says Don Billhardt, assistant director of technical services at Redlands, California's Grand Central Rocket Co., "stems principally from the development of solid propellants . . . fuels which are safe to handle and safe to ignite."

Plastic-Covered Welder

Typical is the rocket welder. Packed inside its straw-like plastic tube (¼-in. dia. and some 20 in. long) is solid rocket fuel. The propellant can be ignited with a match. And, since it carries its own oxidizing agent (ammonium nitrate, a common fertilizer), the device operates readily underwater. Once lighted, it attains temperatures in the 4000 F range (hot enough for most routine maintenance chores). The plant man merely runs a welding rod in the "torch's" path, as though he were soldering. Result: a welded joint. A small job completed, the device can be extinguished simply by snipping off the tube. The burning portion quickly goes out, leaving unburnt—and usable—the rest of the slender rocket-fueled torch.

Aerojet General Corporation's newly devised Aeropak should, within the next few years, give plant engineers seven-league boots.

Says Aerojet's project engineer, George F. Trudeau, "We have developed the first practical rocket-hoist device . . . which can lift a man hundreds of feet into the air, with perfect control . . . and safety."

Let's say that a transformer 50 ft atop a power pole must be repaired. The plant man would shoulder his Aeropak, a harness rigged with two rockets. Fueled by a liquid propellant (hydrogen peroxide), the rockets' thrust is adjustable from a control device held in the hand.

The maintenance man, without climbing a pole, or hoisting a ladder, merely triggers his rockets . . . and, lifting slowly, is carried aloft. A little manipulation puts him atop the power pole . . . and within reach of the transformer. Having repaired the unit, he again triggers his rockets . . . and descends.

Aeropak is no gimmick. It was developed to carry shock troops across difficult terrain (hills, rivers, lakes) like aerial commandos.

Safe Exhaust

What's more, the exhaust from Aeropak's nozzles isn't dangerous at all. Though heat in the rockets' combustion chambers may flare to 1300 F, exhaust nozzle temperatures range between 150 to 200 F. Further, nozzle exhaust isn't flame but superheated steam. Exhausts have been directed at clothing—and even at bales of hay—without damage.

Aeropak, already man-tested in tethered flight (the wearer restrained by ropes to prevent him rising more

Rocket-powered fire extinguisher, pressured by a propellant "pill," throws special extinguishing agent up to 40 ft. Four back-packed rocket "wands" are carried in a cardboard pack that weighs 9 lb. Each extinguisher holds ¾ gal.

Rockets—for Plant Engineering

than a few feet from the ground), promises to turn plant repair crews mobile.

Says Aerojet's Trudeau, "We expect the device to be used by most plant fire departments . . . for rescue work. But power companies seem just as eager to strap their repair crews into rocket harnesses. Hundreds of routine plant jobs—and structures—can be reached with Aeropak . . . and without resorting to ladders."

Line Heaving Gun

Equally sure to find its way into plant use is the line-heaving rocket gun developed by Grand Central Rocket Co. for the U. S. Maritime Service. Involved is a fist-sized Very pistol (the same type used to fire distress signals at sea). Loaded into the pistol is a small, solid-fueled rocket (not much larger than a modest sized Roman candle).

To the rocket is fixed a light line . . . and to this a heavier line . . . perhaps a telephone cable. The gun is fired. The rocket carries the light line to target . . . a plant's water tower . . . roof or process structure.

For Razing Buildings

The demolition rocket, already under study by firms engaged in razing plant structures, is designed to take the guesswork out of the tear-down operation. Suppose that a building is being demolished and, for safety's sake, it's necessary that walls fall inward. Welded or otherwise fixed to each wall is a barrel-like rocket fixture. Small rockets, their thrust calculated to overcome any outward thrust of the walls, are loaded into these barrels—and the rockets fired as the building is felled. Rocket powered thrust, like a battering ram, pushes the walls inward . . . precisely as desired.

But rocket pressure has even greater potential in U. S. plants. Already the Navy is using pressure from rocket ignition to empty ballast tanks . . . and to do the job in seconds rather than hours.

"Pressurization is perhaps the most readily usable output from rocket fuels," says one engineer. "For example, we're developing a hand-sized device which will inflate tires—or any other inflatable structure—in seconds. Utilized is exhaust pressure from safe, fast-burning solid propellant."

Solid Fuels are Safe

Solid propellant deserves closer scrutiny. For one thing, the very idea of toying with a rocket fuel is apt to discourage plant engineers. It shouldn't. For solid propellant won't ignite unless triggered electrically or unless you put a match to it. Even then, contained in fire-resistant plastic, it merely burns. A hunk of the pliable, rubbery stuff can be burnt, in fact, in an ash tray—without danger.

When a PLANT ENGINEERING reporter took a close look at solid propellants at Grand Central Rocket Co., engineers put the match to a hunk of propellant—nested in a glass ashtray. The propellant burned . . . but did no damage. Moreover, the experiment was conducted on an executive's desk.

Safety Devices

Consider again those rocket vehicular brakes. All the road-pounding imaginable won't set off the solid fuel. To ignite, the driver must press a button which actuates a spring-loaded hammer which, in turn, whacks a percussion cap. The cap ignites and in turn, fires the main braking charge.

Rocket power? It's out-of-this-world power . . . no doubt about it. Yet, Buck Rogerish as it may sound, rocket power is being groomed as a maintenance tool . . . as an emergency welder, as an aerial elevator for maintenance crews, as rail-car positioner for your plant's dockside and as a layer of many types of plant communication lines.

For rocket power is destined to become a maintenance tool and sooner than you may think. **End**

Steam-jet rocket, called Aeropak, is being flight tested for use in all sorts of civilian occupations. Example: maintenance in hitherto hard-to-get-at places.

Presenting:

THE PACKAGED BOILER . . .

Here are design advantages and sample specifications

IN THE EARLY 1930's a new idea in steam generation was introduced. This was the packaged boiler. The packaged boiler differed from conventional boilers then in widespread use in industry, both in its construction and application. It offered the user many operating advantages, plus the convenience of dealing with a single manufacturer for the finished product.

Application of packaged boilers for military uses in the 40's proved the usefulness of the boiler. It was compact, easy to set in operation and was ideally suited for the production of steam at remote bases and aboard LST's and other ships. The packaged boiler today is pre-engineered by a single company, giving the interested user a complete and integrated package. It is ready for installation and connection to service lines on arrival. Before shipment every boiler is fully performance-tested in the manufacturer's plant. Underwriters' Laboratories approves the complete package.

Built-in draft system provides all the air for combustion. Boiler operates at high efficiencies — usually at a guaranteed 80 per cent factor over a range from 30 to 100 per cent of full load. The packaged boiler is noted for quick response to fluctuating loads. After the packaged boiler is installed, it is started and adjusted under the customer's load conditions by a factory-trained serviceman.

The ASME Boiler and Pressure Vessel Code established standards for materials, material thickness, workmanship, fabrication procedures. However, the designer of a packaged boiler can establish his own design standards as they relate to fuels, multi-pass construction, methods of controlling air for combustion, furnace location, matching furnace size to burner and heating surface.

Older coal-fired, fire-tube boilers were generally two-pass. They operated with natural draft; gas velocity and draft losses were held to a minimum so coal could burn properly. In the modern packaged boiler using forced draft, the pressure drops are a less critical factor and the number of passes is increased for better efficiency.

Underwriters' Laboratories distinguishes between an "A" label for burner only and a "B" label for a boiler-burner unit. To meet the UL requirements for the B label, the packaged boiler is tested as a complete unit by UL inspectors. Retests and reapprovals are necessary as new models are developed. The factory tests are designed to assure efficiency, long life of components and reliability with components checked under operating conditions.

To sum up the packaged boiler, these advantages are set forth by their makers:

1. Designed for greater convenience of both the user and manufacturer. Manufacturer, not the user, puts together boiler, burner, and controls. Field engineering problems are held to a minimum.

2. There is a single responsibility from one manufacturer — a major advantage for the user in over-all performance guarantees, service and parts.

3. Simplicity of installation. There are savings in time and labor because the boiler is easily moved from one location to another.

Here are representative specifications offered as a guide covering a packaged boiler, for operation with Bunker C oil:

General Specifications. The boiler shall be a multiple-pass horizontal fire tube up-draft (low furnace) boiler with five square feet of heating surface per rated boiler horsepower. It shall be mounted on a heavy steel frame with integral forced draft burner and burner control.

Complete boiler-burner unit shall be approved as a unit by Underwriters' Laboratories and shall bear the Underwriters' label. It must be

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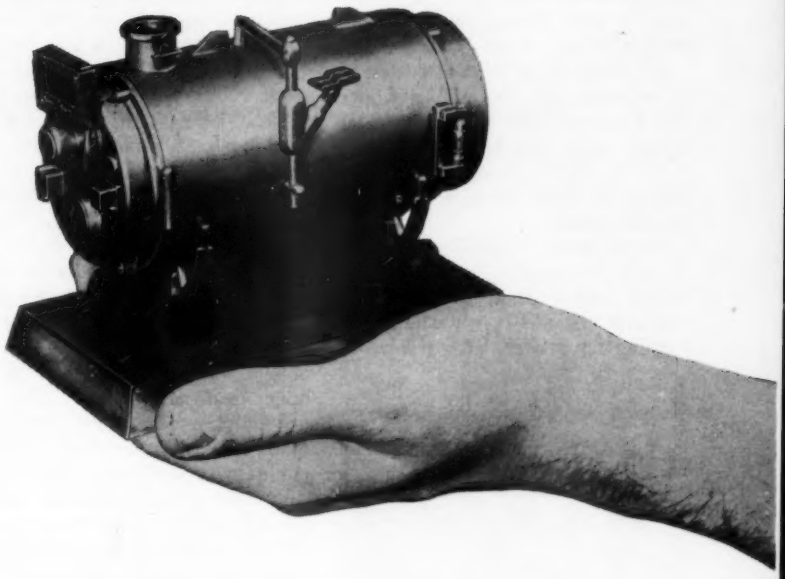

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1. Designed for greater convenience of both the user and manufacturer. Manufacturer, not the user, puts together boiler, burner, and controls. Field engineering problems are held to a minimum.

2. There is a single responsibility from one manufacturer — a major advantage for the user in over-all performance guarantees, service and parts.

3. Simplicity of installation. There are savings in time and labor because the boiler is easily moved from one location to another.

Here are representative specifications offered as a guide covering a packaged boiler, for operation with Bunker C oil:

General Specifications. The boiler shall be a multiple-pass horizontal fire tube up-draft (low furnace) boiler with five square feet of heating surface per rated boiler horsepower. It shall be mounted on a heavy steel frame with integral forced draft burner and burner control.

Complete boiler-burner unit shall be approved as a unit by Underwriters' Laboratories and shall bear the Underwriters' label. It must be

completely preassembled and tested at the factory, these tests being subject to observation by engineers. After factory test, fitting and controls which might be damaged during shipment should be removed and match-marked for ready reassembly. Two lifting eyes must be located on top of the boiler.

The boiler shall be constructed in accordance with the ASME Boiler and Pressure Vessel Code and must receive authorized boiler inspection prior to shipment. A copy of the inspection report must be furnished the purchaser.

Front and rear doors on the boiler shall be hinged. Doors are to be sealed with asbestos tadpole gaskets and fastened tightly using nonfreezing cap screws. Rear refractory

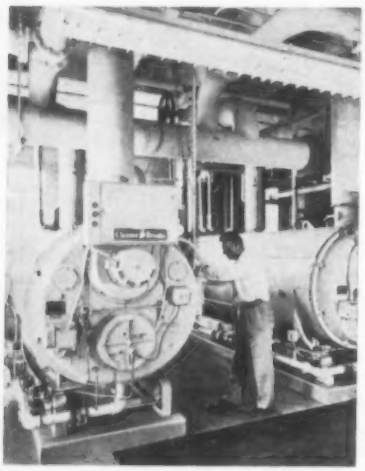


Fig. 1. Packaged boiler installation brings out compactness of such units.

and insulation shall be contained in the rear door which must swing open for inspection of brick work.

Front and rear tube sheets and all flues must be fully accessible for inspection or cleaning when the doors are swung open. The shell shall be furnished with adequate hand-holes to facilitate boiler inspection and cleaning. A manhole shall be provided for access to the water side.

The exhaust gas vent shall be located near the front of the boiler on the top center line, and contain tight sealing sight doors for observation of stack conditions.

Observation ports for the inspection of flame conditions shall be provided at each end of the boiler. The boiler shall be equipped with a spring loaded relief door with an asbestos gasket seat.

Boiler insulation shall consist of a 2-in. glass-fiber blanket under sectional sheet metal lagging. This insulation must be readily removable and reinstalled, if required.

Entire boiler base frame and other components shall be factory-painted before shipment, using a hard-finish silicone enamel shop coat.

The following items must be furnished installed on the boiler:

Water Column. The water column shall be piped to the boiler at the factory complete with gage glass, trycocks, drain valve, and vacuum breaker. Included as an integral part of the water column shall be the boiler feed pump control. This control must automatically actuate the motor-driven boiler feed pump to maintain proper boiler water level. The water column shall also include the primary low water cutoff to shut off the burner automatically in the event the water falls below safe levels.

Auxiliary Low Water Cutoff. An auxiliary control shall be mounted on the opposite side of the boiler from the water column to prevent burner operation in the event of low water.

Steam Pressure Gage. Steam gage shall be located at the front of the boiler and shall include shutoff cock and test connection.

Pop Safety Valves. Boiler shall be equipped with one or more safety valves of the type and size to comply with code requirements.

Stack Thermometer. A dial type stack thermometer shall be mounted in the exhaust gas vent.

Steam Pressure Controls. Pressure controls to regulate burner operation shall be mounted near the water column and shall be of the potentiometer type to provide full modulation of the burner.

The following equipment is to be mounted on the boiler unless otherwise indicated:

Burner. The burner shall be the low pressure air atomizing type approved for operation with Commercial No. 6 oil, CS 12-48, or lighter. The burner shall operate with full modulation through potentiometer type positioning controls. Burner must always return to low fire position for ignition.

Combustion air damper and cam-operated oil metering valve shall be operated by a single damper control motor to regulate the fire according to steam demand.

The gas pilot shall be the premix type with electric ignition. An electronic detector shall monitor the pilot so that the solenoid oil valve cannot open until pilot flame is established.

Burner and Controls Locations

Burner and controls shall be mounted on front boiler door which shall swing away from the boiler, making all parts of burner completely accessible for inspection and maintenance.

Blower. All air for combustion shall be supplied by an impeller type blower mounted in the front boiler door above the burner to eliminate vibration and reduce noise level. The impeller shall be cast aluminum with radial blades. It should be carefully balanced and directly connected to a flange type motor.

Oil Pump. The oil pump must have a capacity greater than twice the maximum burner rating and be complete with motor, starter, base and suction strainer. The pump shall not be integral with the burner but is to be mounted in a location favorable to oil storage tanks.

Burner Piping. The atomizing air system shall include the belt-driven air compressor with lubricating oil tank, oil level indicator and pressure gage. The fuel oil system shall have relief valves, oil strainer, metering orifice, solenoid shutoff valve and cam operated metering valve. The oil shall be preheated by a steam heater and a 7½-kw electric preheater, each with individual thermostatic control. Both heaters must be installed in a single body with controls set to cut out electric heater when steam is available. The metering valve shall permit circulation of hot oil to the burner and back to the oil storage tank. The burner oil piping and nozzle shall be purged of oil on each shutdown.

Burner and Flame Failure Controller. The program relay shall control ignition, starting and stopping

(Continued on page 254)

Are You On a PLANT DECISION MERRY-GO-ROUND?

It will simplify decision-making if there are

1. Fewer rules
2. Better communications
3. More understanding

By MARGARET K. CHANDLER, Assoc. Professor, University of Illinois Inst. of Labor and Industrial Relations

FOR A VARIETY of reasons, personnel in a multi-plant company hesitate to involve headquarters in decisions affecting plant problems. Some of the difficulties involved in decision making, especially with regard to contracting out maintenance and construction work[1] —a decision which usually involves the plant engineer—will be discussed here.

A possible answer to the headquarters versus plant decision dilemma involves achieving a compromise between conflicting tendencies to "generalize" and "particularize". Thus, after a series of local problems of the same type has been handled by headquarters, there is an inclination to issue generalized edicts governing local behavior. These may seem like brilliant solutions at headquarters, but for the local man, they only compound his difficulties and provide him with another way of getting into trouble —another rule; the possibility of disobeying it; the probability of suffering the consequences.

Headquarters should be more than a source of regulations. Rules have their place of course, but some types of situations are not made smoother because there is a rule available to govern them. There is a need to play by ear, and to give local management a continuing role in matters that move to headquarters.

One of the reasons that the local plant engineering group hesitates to involve headquarters in their decisions is red tape. The chief engineer at a heavy equipment works commented:

"Any job over $25,000 is a headquarters decision. Somehow our estimates tend to come out $25,000 minus one. We try like everything to keep away from that figure."

In some cases the desire to keep away from headquarters leads plant personnel to "bury" jobs that would clearly cost over the limit for local decision by dividing them into smaller jobs.

Within a given company, the various plants will differ in their relationship with headquarters. One plant manager expressed the feeling that construction needs could be handled best locally in his establishment, but he noted that others in the same company turned to headquarters much more frequently:

"There is tremendous variation in practice in this company. It depends on what is available locally and on the personnel you have. We don't like to turn over work to the construction engineering department if we can help it.

"If you give them a job, they do it completely and we find we often don't get the kind of buildings we need. It may suit the engineering department, but we can't live with it.

"Our plants in A and B cities turn over much more to them. Well, that way you delegate the responsibility and you have someone to blame if things go wrong."

The benefits of delegation of responsibility—and potential blame—to headquarters with its wider resources and experience are considerable and local plant personnel who avoid headquarters participation must not be regarded as blind resisters of higher authority.

Rather, they are persons faced with the difficulty of adequately communicating their needs upward, uneasy about changes that another organization will introduce into plans, and exasperated by the red tape involved in justifying and explaining their needs. (Turn page)

[1]Factors involved in this decision were the subject of research based on a proportionately stratified random sample of 74 companies, normally employing 1000 or more people and representing 16 industrial groups. In each establishment intensive interviews were conducted with the members of management involved in this decision. The basic survey findings are presented in: Margaret K. Chandler and Leonard R. Sayles, "Construction and Maintenance: Who Contracts It Out and Why," PLANT ENGINEERING, Vol. 13, No. 2, Feb. 1959, pp. 119-122.

Are You on a Plant Decision Merry-Go-Round?

Potentially there are many parties at interest in the decision whether to contract-out or do work with in-plant forces. In the simplest case a plant official assesses criteria he considers relevant—cost, timing, availability of men, etc. and on this basis, he makes a decision.

When other parties enter the situation, say, the local plant union, and exert influence, the original decision-maker finds himself confronted with questions outside his sphere, persons representing other functions in the company are involved, and the job of communicating and explaining is expanded.

Few persons or organizations willingly take on the troubles of another, but after trying to fathom "secondhand" the points at issue in a local debate, headquarters may conclude that it would be wise to take part in all decisions when they are made initially.

However, one top management interviewee recounted an instance where a move to clear everything through headquarters was rejected because it was felt that ultimately it would complicate matters by intensifying pressures on local personnel to settle at all costs:

"When we have had trouble there has been talk of moving the whole business to headquarters. I don't know if any 'ukase' was ever promulgated but there was talk that contracting decisions should clear on up so that headquarters people could keep abreast, but nothing ever came of it.

"We have tried to see that the local people have the proper resources available to them so they can make the best decisions, because it is best to take developments case by case at the local level."

After a siege of trouble, headquarters may not wish to assume authority but instead may initiate a move to shift the final decision to a higher level in the plant organization.

In the following instance the interviewee at company headquarters recounted a new plan for clearing through the works manager decisions that formerly ended in the office of the plant mechanical engineer:

"There has been laxity with respect to the centralization of this decision by management. The works manager often hears about the matter for the first time when the union files a grievance. We are instituting a new setup. Every one of these decisions will have to be cleared for approval by a central department under the works manager. At present most of them end in the mechanical engineer's office."

Interestingly, another case was uncovered where top local management had gone through the process of being involved in every decision and had finally turned in despair to a reverse strategy of having these matters settled at a low level in the organization—the master mechanic —with the admonition to solve everything at that level. There was to be no trouble. The frustrations suffered by this man can be understood quite readily:

"We have been told that there are to be no disputes. We cannot allow an issue to arise. Or should I say, that if we do, the company will not back us. If anything like that happened, I would be in trouble. And I have gotten into hot water for that very thing. I know.

"The way things are now— the men insist on having a job, and then they don't get around to it—we have a tremendous backlog of work and no way of reducing it. I can't see that, but I've argued and there is nothing I can do about it. The front office won't move."

Here we have the reverse of the upward move to clear through headquarters. In this case it led to a situation where troubles do not pile up, but work does.

The plant engineer plays a major role in the contracting decision. Normally we would expect to find him serving in either an active or an advisory capacity. The following job description was given by an interviewee who felt that his position was similar to other plant engineers':

"I have my engineering and technical staff and the maintenance superintendent is also under me. He has charge of electricians, carpenters, pipefitters, yard crews, etc.

"Our principal purpose is to maintain buildings and equipment. We also do certain construction work in particular fields within the limits of our work force and equipment. If a job is unusual or large it may be contracted out. My department estimates the work to be done. We either make the necessary working drawings ourselves or occasionally we commission an outside firm to do drawings and specifications. Then we get approval for funds.

"If we decide to contract out the work, I contact the purchasing department for a list of potential contractors. The contractor is selected and the purchase order given.

"The central staff gets in when funds are requested in excess of $20,000. We send our estimates in for approval. Under that amount, I handle them myself, although the bigger ones I clear through the plant manager."

Occasionally situations were encountered—largely in companies employing 2000-3000—where this picture of clearly delineated functions was not present in practice.

In some cases a substantial part of the engineer's function was informally located at a lower level and in others at a higher level in the organization than original design decreed.

Authority on paper and authority in practice are not always the same. "Trouble" frequently is the stimulus that forces these two entities apart. Moving the level of a decision in the face or pressures from parties at interest sends a decision traveling the length and breadth of the organization.

Company-wide problems have their beginnings in day-to-day local relationships, and personnel should be guided in their actions by something other than an "avoidance of trouble" principle. They should feel free to experiment toward the achievement of solutions. In the process, some mistakes will have to be tolerated, while continued efforts to find workable answers must be supported by top management. **End**

Fig. 1 Penthouse (arrow) contains some of the air-handling units; five "cubical" structures are cooling towers.

INDUSTRIAL AIR CONDITIONING
Florida Plant Has Equipment Accessibility

THE LARGEST most fully air-conditioned industrial structure in Florida is the Martin Company's plant in Orlando. Five hermetic centrifugal water chillers provide more than 3000 tons of cooling to all but a few small areas. These areas require special ventilation for excessive heat and fume removal.

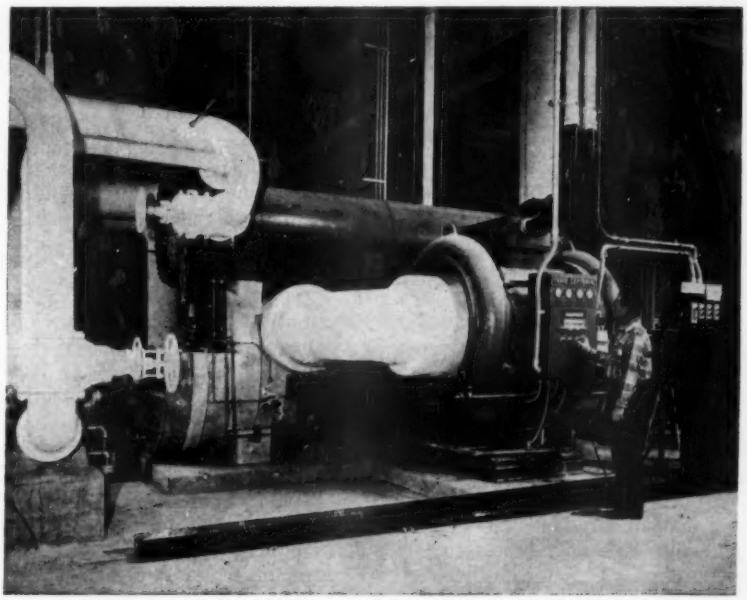
Air conditioning was installed for the following reasons: To combine employee comfort and production quality with minimum equipment maintenance, and also to attract and keep skilled labor.

When Martin decided on the Florida location, they insisted not only on a modern installation suited to efficient production—but also on a plant that would be compatible with the climate and surroundings.

The main building has a two-story office-engineering area and a one-story plant manufacturing area. The manufacturing area has the same roof height as the office section. The office-engineering portion (including cafeteria) contains 162,000 sq ft, plus 27,000 sq ft devoted to laboratory research. The manufacturing area has 224,000 sq ft. An adjacent general service building and three other auxiliary buildings bring total floor space up to approximately 500,000 sq ft. Where possible, building materials are used which are calculated to reduce the air conditioning load.

Foundations are of the spread-footing type on compacted earth-fill, with a plastic sheet beneath the floor slab to preserve concrete strength. The seal-sheet prevented the earthfill from dehydrating the

Fig. 2. One of the compressors used in chilling water for air-handling units.



concrete too quickly and assured proper hardness. The 6-in. concrete floor slab is finished with white abrasive to minimize slipping and wearing, and to allow good light reflection.

The lower part of the manufacturing plant exterior walls is stuccoed concrete block. Upper part of the perimeter walls is Galbestos V-beam siding. Glass fiber formboards are on the inside of the siding. This cuts down heat transmission and provides important acoustical properties and light reflection. All exterior walls of the plant are non-load bearing and may be moved and reused for expansion. Plant doors are specially designed for rapid opening and closing, so as not to place an unnecessarily heavy load on the air conditioning equipment.

A built-up slag roof, over gypsum poured in place on 1¼-in. formboards, provides a low-cost roof with a low 0.14 Btu heat transmission factor. A light-colored finish on the manufacturing plant ceiling, like the floor, increased reflection and reduced the required number of lighting fixtures and the lighting heat load. All production machine faces and exposed structural members are also painted in light colors.

To achieve "Floridability," a feeling of outdoor living was created by the inclusion of large glass expanses in the building design. As a result, panoramic views are possible from the office-engineering departments and cafeterias. These major glass areas, however, are oriented to the north to reduce the air conditioning sun load. Even so, they created an air conditioning problem. The manufacturing plant area is windowless.

The peculiarities of Florida weather also had to be taken into consideration in the air conditioning work. Downpours of long duration are rare, but there are frequent short showers that come up suddenly and quickly alter the heat transmission of the building and raise the humidity. As a result, there had to be a high degree of control for rapidly changing conditions.

After the sun goes down, there is a drop in dry-bulb temperature. This condition necessitated the incorporation of automatically controlled reheat coils in order to meet standard comfort requirements.

Fig. 3 The long roof penthouse includes air-handling units for office areas.

Other plant air conditioning problems that had to be overcome included the heat generated by a wide variety of machine operations, and strict humidity control had to be maintained in the areas where electronic equipment was being assembled.

The five systems included in the over-all plan provided the answer to these numerous problems. They are of a type of industrial system that has versatility and low operating cost. It is the multiple-unit central system which utilizes a relatively small factory-built air-handling unit for each zone for better control of local conditions. This unit includes a casing, cooling and heating coils, filters, fan motor and drive. Water is piped to the unit coils from a central source to provide the necessary cooling or heating.

All of the office-engineering-laboratory part of the main building is conditioned by air-handling units in a continuous roof penthouse at the front of the building. See Fig. 1. All of the air handling units for the plant manufacturing area are placed on platforms throughout that area.

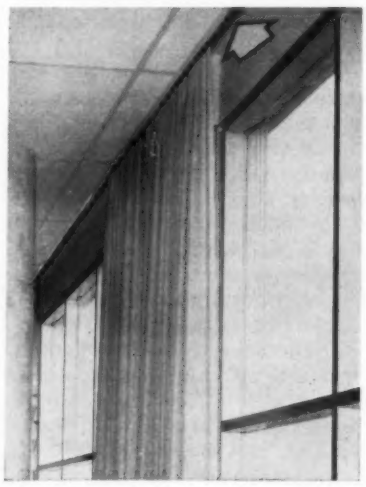
The type of air conditioning outlets vary according to area requirements. The offices have combination supply and return outlets which allow complete flexibility of movable partition arrangement without providing outlet relief grilles in floors or partitions. Supply ducts are in the space above a suspended ceiling, and this space also acts as a plenum for return air.

Air conditioning outlets, lighting and acoustical ceiling patterns in the office area are modular. Acoustical board can be removed easily to permit changes in the services located above the ceiling.

The controls for the office area were zoned to handle the north side

(Continued on page 256)

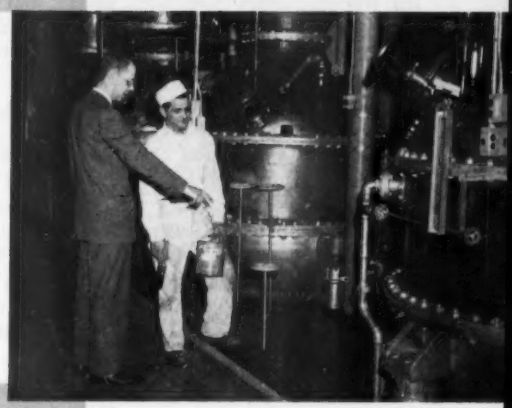
Fig. 4. Arrow points to inconspicuous grille for forcing air over the glass.



Better communications . . .

More realistic production schedules . . .

Improved esprit-de-corps . . .



WITH AREA ENGINEERING

By **WILLIAM G. MEIER, Assistant Director of Engineering, Parke, Davis & Company, Detroit, Michigan**

OUR ENGINEERING DIVISION is responsible for the design and construction of domestic and overseas plants, and for maintaining the Detroit plant. The latter has a floor area of 2,000,000 sq ft and includes 83 buildings.

The division is composed of three principal parts, namely Area Engineering, Central Engineering, Construction and Maintenance. We have found it convenient to compare their relationship to those of client, consultant, and contractor—the three C's, as we call them.

The client is the area engineer; he is stationed in the manufacturing department and is attuned to its needs. If the problem is one he is unable to solve, he turns it over to the consultant—Central Engineering. Requirements described by the area engineer are studied and design work follows to meet them. The plans reflect a solution satisfactory to the area engineer and are executed by Construction and Maintenance—the contractor.

Prior to the formation of the area engineering subdivision in 1952, all requests were directed to Central Engineering after being initiated by the product department managers. The advent of Area Engineering brought with it a change of philosophy in this respect, and a selling job.

Central Engineering had to be convinced that a field organization would enhance the overall effectiveness of the engineering division, and production people had to be shown that their needs would be met more effectively while freeing managers to devote their full energies to production problems.

As area shops were estabished, the construction and maintenance group people felt the encroachment upon their territory, and they had to be shown the advantages of the new arrangement.

Union officials were concerned lest the area shops, isolated and removed from surveillance, might tend to cross craft lines, and engage in other unorthodox practices. The road, to be sure, was beset with obstacles. Fortunately they were well-obscured at the time, and we went ahead.

In retrospect, we would have done some things differently: we would have commandeered a top-level assist in our selling job, and we would have adopted an area organization even sooner than we did. But we're happy with it. For one thing, we're doing a better job than we've ever done before—that's unanimous. And, to boot, we're doing it with 34 less people in our shops—including those in the area shops as well! So, it's been well worth the effort. But, nevertheless, we'll try to give you a few pointers on how to avoid doing it the hard way!

Area Engineering is a form of decentralization; it is organizational decentralization, and it is particu-

larly advantageous to the larger plant. It is a regrouping of forces into smaller, more manageable units. But it is more than that; it is a philosophy of operation that establishes responsible units capable of solving their own problems, of running their own show; this within the framework of authority conferred, while regularly reporting the results.

But the authority conferred, and the responsibilities demanded must be spelled out. We must decide on the functions of the area organization. And this decision just about describes the job of the area head. At the time when our present area engineering system was conceived, we drew up just such a list of specific duties.

The individual areas were carved out of the plant entity only after careful study. We were particularly anxious to have area limits conform with department limits, including one or more entire departments in each area. Unfortunately, however, many of the operating departments are separated into parts. This presented some problems since, by definition, the areas are geographic units. The ideal situation would be where each department is housed in a separate building.

But, then too, it's also necessary to consider engineering and maintenance workloads. Fortunately, our records in this respect were reasonably accurate, and it was possible to tabulate man-hours by craft for each area. Dollar value of appropriations served as an index of engineering requirements. Combining then, geographical, departmental, and workload considerations, we arrived at a compromise which has proven to be quite satisfactory.

Search for Area Engineers

It was decided early in the game that we would not limit the area function to maintenance only; it would also include engineering work. Hence the title "Area Engineer" for the area head. Our search for qualified candidates began with Central Engineering. We looked of course for technically competent people, but we also looked for aggressiveness, enthusiasm, tact, and self-reliance.

Our initial effort was in the research division. Service in this area had been a source of difficulty for some time, and even a small improvement would be obvious. A maintenance shop was established, and workloads were analyzed to determine the crafts to be permanently assigned. We were in business!

One by one, over a period of two years, additional areas were staffed until the entire plant was covered with a total of nine. In each case, craftsmen were assigned as the workload analyses dictated. See Forms A and B. About the only limitation on the type of job to be tackled was that it be completed with the men assigned; it being understood, of course, that no small job was to be left undone in order to take on a larger one.

It soon became apparent that many jobs required a skill not represented in the area shop, often to perform a relatively small percentage of the overall job. At this point we provided means for borrowing central craftsmen. A central craft requisition is filled out weekly by the area engineer. See Form C. It summarizes his needs for the coming week by hours and by craft, and it indicates the time the men are needed. No provision is made for transferring men among the areas, it being understood that the area workload is always greater than the man-hours of craft labor assigned.

Some of the advantages of the area shop were not being realized because it was still necessary to make frequent trips to the Mechanical Storeroom. We therefore established area storerooms to provide supplies in regular demand. The stock is replenished every few weeks by a requisition on Central Stores; no further requisitioning is necessary, the items being charged off at the time they leave central stores. See Form D. At this point, I might mention that a stores delivery service is in operation between the central storeroom, and the men in the field. Stores catalogs are available, and the craftsmen make their wants known by telephone.

As the new organization took form and expanded, our system of paperwork, our forms and procedures, our way of doing things had to change too. Memorandums are only a bit better than the spoken

Area #2 – Log of Service Jobs

A

Date	Dept.	Location	Service Job
2/10/	Estab.	102-15	Repair Steam Traps
2/10/	Estab.	102-12	Repair Typewriter
2/10/	Rudolph	102-14	Replace Hood Light
2/10/	Estab.	102-15	Repair Leaking [illegible]
2/10/	Rudolph	[illegible]	[illegible]

B

WEEKLY SCHEDULE

Area #2 Schedule for Week of 12/16/58

INSTRUCTIONS

Arrange in take precedence
Do jobs in order if possible
List unscheduled jobs worked on reverse
List scheduled jobs not worked on reverse

STATUS SYMBOLS

C Completed
NC Job worked – not completed
NW Not worked
D Job delayed

OTHER CRAFTS INVOLVED

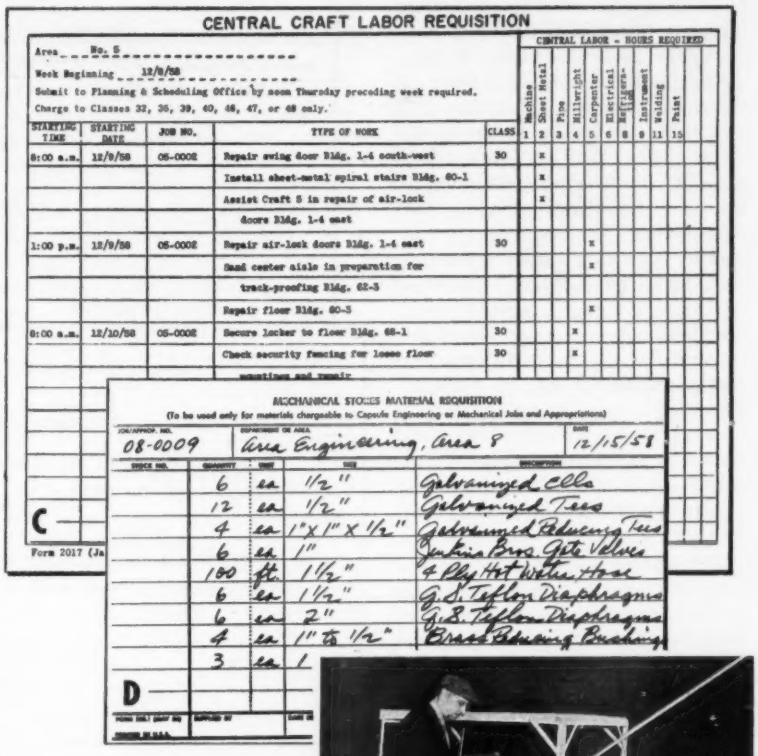
PRIORITY	JOB NO.	DEPT.	DESCRIPTION	L.E.AD (Name)	STATUS	% COMPLETE	Sheet Metal 1	Pipe 2	Electrician 3	Carpenter 4	Mason 5	Painter 6	Welder 11	Plumber 12	Tinsmith 13
1	05-1278	Pill & Tablet	Bldg. 64-5 Pneumatic Drives	E				•		•					
1	8-302-4	Pill & Tablet	Bldg. 64-4-88 MED Thick. Sorting Equipment	A				•		•					
2	05-1221	Dry Pilotaing	Bldg. 64-5 Cyncil Unit					•							
3	05-8009	Pill & Tablet	Bldg. 64-5 Dust Collector					•							
3	05-8050	Pill & Tablet	Bldg. 64-5 Dust Collector												
4	05-8017	Pill & Tablet	Bldg. 64-5 Clean Drain Line												
				T					C		•		•		
4	05-8053	Building	Bldg. 64 Clean Scale Pits	A					•		•		•		
5	05-1254	Building	Bldg. 64-5-88 Repair Grating						•						
5	05-1267	General Mech.	Bldg. 64-5-53 Four Vent Lines						•		•				
5	05-8018	Dry Pilotaing	Bldg. 64-5 Cyncil Air Filter Unit	E				•							
5	8-430-1	Pill & Tablet	Bldg. 64-5-52 Repair Agitator												

(Front)

word. They have a habit of getting lost or forgotten. Something more permanent was needed, and so we started on a Manual of Operating Practices for the engineering division. Between its covers are a good many benchmarks: procedures for handling appropriations and mechanical jobs, symbols used by the drafting department, how the planning and scheduling system operates, etc. Frequent meetings are held to review this material, and to iron out misunderstandings.

Of particular interest in the manual is a job description for every salaried job in the engineering division. Whenever a major change is made in an organization, such as the creation of Area Engineering, it becomes necessary to revise the duties of the people affected. We felt it was a good time to review the duties of all of our salaried people and so, starting at the top, each was asked to write his own job description conforming only to a prescribed format. In each case, a corresponding description was written by the employee's supervisor, and the differences in the two versions were ironed out at a meeting of the two. The resulting job description was published in the manual.

A closer look at our method of handling jobs may be of interest. Most requests are initiated by the area engineer, although smaller repair jobs are sometimes initiated by the department manager. Requests are directed to the area shop or, where there is no area shop, to the planning and scheduling department. Telephone requests are reduced to writing, and taken to the shops several times daily. A copy of the request is sent to the area engineer for his information, and corrective action if repetitive. This pertains to jobs under $50.00.



CENTRAL CRAFT LABOR REQUISITION

Area No. 5
Week Beginning 12/8/58
Submit to Planning & Scheduling Office by noon Thursday preceding week required.
Charge to Classes 32, 35, 39, 40, 46, 47, or 48 only.

CENTRAL LABOR - HOURS REQUIRED

STARTING TIME	STARTING DATE	JOB NO.	TYPE OF WORK	CLASS	Machine 1	Sheet Metal 2	Pipe 3	Millwright 4	Carpenter 5	Electrical 6	Refrigeration 8	Instrument 9	Welding 11	Paint 15
8:00 a.m.	12/9/58	05-0002	Repair swing door Bldg. 1-4 south-west	30		x								
			Install sheet-metal spiral stairs Bldg. 60-1			x								
			Assist Craft 5 in repair of air-lock			x								
			doors Bldg. 1-4 east											
1:00 p.m.	12/9/58	05-0002	Repair air-lock doors Bldg. 1-4 east	30					x					
			Sand center aisle in preparation for						x					
			track-proofing Bldg. 62-5											
			Repair floor Bldg. 60-5						x					
8:00 a.m.	12/10/58	05-0002	Secure locker to floor Bldg. 68-1	30				x						
			Check security fencing for loose floor	30				x						
			sometimes and repair											

Form 2017 (Ja

MECHANICAL STORES MATERIAL REQUISITION
(To be used only for materials chargeable to Capsule Engineering or Mechanical Jobs and Appropriations)

JOB/APPROP. NO. 08-0009 | DEPARTMENT OR AREA Area Engineering, Area 8 | DATE 12/15/58

STOCK NO.	QUANTITY	UNIT	SIZE	DESCRIPTION
	6	ea	1/2"	Galvanized Ells
	12	ea	1/2"	Galvanized Tees
	4	ea	1"x1"x1/2"	Galvanized Reducing Tees
	6	ea	1"	Jenkins Bros. Gate Valves
	100	ft.	1 1/2"	4 Ply Hot Water Hose
	6	ea	1 1/2"	G.S. Teflon Diaphragms
	6	ea	2"	G.S. Teflon Diaphragms
	4	ea	1" to 1/2"	Brass Reducing Bushings
	3	ea	1	

C

D

Fig. 1. Field deliveries of material required for jobs at the plant are made from time to time with this cart.

Emergency Work

Jobs involving over $50.00, called in to the planning and scheduling department are not acted upon, but are written up and directed to the area engineer. If the telephoned request is stated to be an emergency, it is not questioned, but it gets immediate attention. All such emergencies, after being written up, are referred to the area engineer for verification and corrective action where necessary. This procedure has aided us in eliminating false "emergencies."

Jobs involving more than $50.00 are always reviewed by the area engineer. He estimates the cost of doing the work, and shows on the face of the requisition, the reason for doing it. If an appropriation is involved (over $1500.00), the area engineer writes up the request, See Form E, and provides in it, or in a supplemental memo, reasons and benefits to be gained; he also indicates technical considerations of the job. If the job is such that he has the time and technical ability to handle, he proceeds with an estimate, and submits it for approval. If it is one that he wishes to turn over to Central Engineering, he furnishes this department with all available background data, and the assigned central engineer takes care of the design and estimating functions. The resulting package is then submitted back through the area engineer for management approval.

After approval, the estimating engineer (central or area) proceeds with the writing of work orders, purchase requisitions, etc. See Forms F & G. He, then, is responsible for completing the job within the funds appropriated, and in a manner that will meet the needs of production, as defined by the area engineer. Timing of the work, however, is the responsibility of the area engineer as will be explained later.

We've been particularly careful to give the area engineer substantial latitude. We have resisted attempts to limit engineering responsibility of our area people to jobs under a fixed dollar value. They may handle any job regardless of size as long

copy of all job orders including referred to the area engineer for aside, it provides a number of ob-

as it does not interfere with their other duties. Our more capable engineers use this flexibility to good advantage in gaining additional experience, and in satisfying their ambitions to tackle some of the larger jobs. We are opposed to arbitrary limitations, preferring to let each individual use his best judgment.

The planning and scheduling function is an especially important one since it forms a control center for all of our operations. We define planning as: "an orderly appraisal and guarantee of all the prerequisites necessary to insure completion of a given job at a predetermined time." It covers availability of ordered equipment, stores materials, production shut-down, prints, specifications, etc.

Scheduling is defined as: "a system of accomplishing engineering and maintenance at a predetermined time which coincides, as closely as possible, with the date on which the work is required." It implies the orderly use of engineering and trade skills to accomplish the greatest good at any particular time.

Since the planning and scheduling department is charged with the responsibility for best utilization of manpower, it must be guided as to the relative importance of each job. And, in our organization, it is up to the area engineer to provide this guidance. See Form H.

A representative of the planning and scheduling department discusses with each area engineer, weekly, the most important jobs in his section. They are, broadly, in two categories; those still in Central Engineering, and those ready for installation. The composite listing of all such jobs, throughout the plant, is discussed with the Director of Production. They are arranged in order of urgency, and the shop schedules worked out accordingly; each schedule allows a number of man-hours, based on experience, for service calls. The list is also discussed at a meeting with engineering and drafting supervision, and their forces are deployed accordingly.

A word on the area engineer's part in Preventive Maintenance will point up one of his important responsibilities. As mentioned previously, the area engineer receives a

E

APPROPRIATION REQUEST

An appropriation is requested for Process Development Dept. (Department, Location) Priority 5 Area 8 Date 12/15/58

For Bldg. 27 - Air Condition Instrument Room

as follows:

Install suitable air conditioning facilities for the Instrument Room which is located in Building 27.

F

ORIGINATOR: Remove Part 3 and forward balance of set intact to area engineer.

Planning & Scheduling Use Only

Parke, Davis & Company

MECHANICAL REQUISITION

Engineering Use Only

Date Rec'd.	Class	Area	Job No.
12/15/58	51	2	02-1024

Prop. P. O. Asset No. 4 15063 Accounting No. ---

Request No. | Department, Section or Location: Extract

Date Wanted: 1/15/59 | Equipment Availability (Date and Time): 1/11/59 to 1/15/59 | Person to Contact: Mr. C. V. Dostie | Estimate No. --- | Shutdown Required: ☐ None ☒ Minor ☐ Major

Bldg. 65 | Floor B | Col. or Loc. 96 | Job Title: Replace Alcohol Pump

JOB SPECIFICATIONS

Install a new Viking Pump equipped with a mechanical seal to replace present unit which is used for the transfer of recovered alcohol.

G

PLANNING & SCHEDULING USE ONLY: DATE REQ'D. | COPIES REQ'D. | DATE COMPL. | DATE SCHED.

PARKE, DAVIS & COMPANY
ENGINEERING DIVISION
PARTIAL NO. 1 of 1 FINAL X
WORK ORDER
(WORK SHEET)

DATE WRITTEN 12/15/58 | ESTIMATE NO. --- | JOB/APPROP. 02-1024

PRIORITY 4 | TRANSFER NO. 1358 | DRAWING NOS.

AREA	DEPT. OR SECT.	BLDG.	FLOOR	COLUMN OR LOCATION	EQUIPT. AVAIL. (DATE & TIME)	P.O. ASSET NO.	PERSON TO CONTACT
2	Extract	65	B	96	1/11/59 to 1/15/59	15063	Mr. C. V. Dostie

TITLE OF JOB OR PARTIAL: Replace Alcohol Pump

SHUTDOWN REQUIRED: ☐ NONE ☒ MINOR ☐ MAJOR

OPER.	CRAFT	WORK TO BE PERFORMED (Indicate complete requirements as job will be limited to work described)	EST. HRS.
A	3	(Pipefitters) Lock-out motor pump, then disconnect all piping to alcohol transfer pump.	4
B	4	(Millwrights) Remove pump and scrap as per Transfer No. 1358. Install new pump and check alignment.	8
C	3	(Pipefitters) Reconnect all piping to new pump and test run to determine adequacy of entire installation.	8

Do only the work described - Use only the materials listed.

MATERIAL REQUIREMENTS

ITEM NO.	QUANTITY	RECOMMENDED VENDOR	PURCHASE REQN. NO.	REQD. DELV. DATE	ESTIMATED COST STORES	ESTIMATED COST PURCHASES
		Kerr Machinery Company	29532	1/10/59	$	$
1	1	Rotary Pump, Viking, Model H-124, with ball thrust bearing, graphitar bushing, mechanical seal, and 316 stainless steel shaft.				120.00
		Stores Items				
1	10'	1" Copper Pipe			15.00	
2	5	1" Copper Fittings			7.00	

Specify delivery instructions if delivery is not to Detroit Plant.

LABOR ESTIMATE SUMMARY

CRAFT NO.	3	4						
ESTIMD. HOURS	12	8						
DATE COMPL.								

APPROVALS

AUTHORIZED BY (ENGINEER) C. V. Dostie NO. 81 FOREMAN

O.K. TO SCHEDULE (PLANNER)

REVIEWED BY (FOREMAN) CRAFT

TOTALS $ 22.00 $ 120.00

SHEET NO. 1 of 1 JOB/APPROP. NO. 02-1024

FORM 1205.1 (OVER SO FRONT)

copy of all job orders including service requests called in to Planning and Scheduling. Those which are repetitive are studied to see if a more permanent solution can be found; they may be referred to Central Engineering, to Mechanical Development, to Instrumentation, or they may be covered by standing work orders if no other answer appears practical.

The standing order insures performance of repetitive maintenance or service work at predetermined intervals and on a planned basis. It is used in preference to an inspection where past experience has verified the need of performing a specific task periodically.

The preventive maintenance group checks selected equipment on a plant-wide basis through a corps of inspectors. Their recommendations, written as work requests, are submitted to the area engineers for approval. At each check, the inspector either initials the record signifying satisfactory conditions, or he shows the number of any work request issued. In the event of equipment failure, the inspector must explain his initialing or the area engineer must explain his failure to approve the work request, as the case may be.

Fixed asset records accruing an inordinately large repair cost are referred to the area engineer for consideration of alteration or replacement of the equipment.

Another important responsibility of the area engineer is the preparation of budgets; one for maintenance and repair, one for capital expenditures, and one for utilities. Since engineering provides and maintains the physical assets, it is logical that they prepare the appropriate budgets, and control the expenditures. Each area engineer receives an IBM report showing, by class of work, his repair and maintenance expenditures for the previous month. Variations from budget are discussed with his engineering manager and expenditures curtailed, or budgets increased as indicated. The maintenance and repair budget for the entire plant is a summation of the individual area budgets.

The capital expenditure forecast is made up annually in two parts; one listing those items to be acquired during the next twelve months, and the other, those to be acquired during the next five years. The first of these is reviewed quarterly, and any item appearing on it will be evaluated, and either covered by an appropriation or abandoned during the year. This takes the report out of the category of a "wish-book", and makes of it a living, useful document. As an aside, it provides a number of objectives for the area engineer as well!

All in all, as we've said before, we are pleased with the area organization. Here are some of the reasons:

1. The production man now gives his undivided attention to production.
2. Engineering assumes responsibility for the condition of all fixed assets.
3. Through their close-working relationship, production managers and area engineers appreciate each other's problems more fully—communications are better.
4. Engineering is in on all changes, right from the beginning—planning is better. There are less "emergencies" and small jobs receive more attention.
5. Central Engineering, now freed of the many minor jobs accomplished in the areas, is properly staffed with specialists to handle the major jobs.
6. The Area Engineer obtains much of the field data for Central Engineering.
7. Required completion dates are more realistic than formerly.
8. Area shops have enabled us to render better service—cut down walking time.
9. Explaining backlog status to production people has enabled us to push jobs involving crafts with low backlogs, and defer those with higher ones, thus stabilizing work loads.
10. Each area takes pride in its performance and in its appearance as a result of improved esprit-de-corps. Area Engineers are close to the craftsmen.
11. The men assigned as Area Engineers, faced with a variety of problems become capable managers in time. Additional development is provided by occasional rotation among areas.
12. The orientation program for new technical personnel includes spending time with each Area Engineer, rapidly familiarizing employees with plant operations. **End**

Craft: Millwright: Schedule for Week of 12/15/58

CENTRAL CRAFT WEEKLY SCHEDULE

H

INSTRUCTIONS
Emergencies take precedence
Do jobs in order if possible
List unscheduled jobs worked on reverse
List scheduled jobs not worked on reverse

STATUS SYMBOLS
C Completed
NC Job worked – not completed
NW Not worked
D Job delayed

EST'D HOURS	JOB NO.	DEPT.	DESCRIPTION	PRIORITY	LEAD PERIOD	STATUS	% COMPLETE	OTHER CRAFTS INVOLVED: Machine 1	Sheet Metal 2	Pipe 3	Millwright 4	Carpenter 5	Electrical 6	Mason 7	Refrigeration 8	Welding 11	Pneumatic 12	Paint 10
Area 1 2	01-0888	Fluid	Bldg. 64-1-83 Exhaust for Installation	4	4						•		•	C				
80	8-480-1	Fluid	Bldg. 64-1 Piston Filling Machine	1					•	•	•	•	•			•		
Area 2 60	8-185-2	Extract	Bldg. 14-2 Abbe Cutter	4	4				•	•		C	•	C		•		
8	8-204-5	Production	Bldg. 65-4 Add Lab Facilities	3	6								•					
8	6-522-1	Extract	Bldg. 64-65 Alcohol Storage	3	3				•	•		•	•	•		•		
Area 3 8	03-1221	Dry Finishing	Bldg. 64-3 Cycoil Unit	3	4				•									
40	03-1254	Building	Bldg. 64-3-93 Repair Grating	5	4								•			•		
16	8-420-1	Pill & Tablet	Bldg. 64-5-52 Repair Agitator	5	1			•			•							
16	03-9019	Dry Finishing	Bldg. 64-3 Cycoil Air Filter Unit	5														
16	03-9016	Pill & Tablet	Bldg. 64-5 Change Filter Oil	1														
8	03-9026	Pill & Tablet	Bldg. 64-5 Dust Collector	4														
Area 4 8	04-1215	Biological	Bldg. 65-6 Install Deodorizer in Men's Rm.	4	4								•					
24	03-1278	Pill & Tablet	Bldg. 64-5 Dismantle Drives	1														
10	8-280-1	Ampoule	Bldg. 24-1 Vibratory Feeder	3	1			•					•			•		
16	8-340-1	Ampoule	Bldg. 65-4 Install Security Fence	3	4							C				•		

FORM 2575 (REV. 9-58) (Front)

Fig. 1. Weldor running vertical bead below ground level at the corner of the 17,500-gallon tank. Fabrication was done inside a pit lined with blocks faced with reinforced grout.

BUILT-IN-PLACE OIL TANK REPLACES LEAKY UNDERGROUND VESSELS

By S. F. COMMONS, Plant Engineer, Brown Instruments Division, Minneapolis-Honeywell Regulator Co.

FABRICATING a 17,500-gallon fuel oil tank beneath the basement floor level of an operating plant was a problem-solving experience of the Brown Instruments Division of Minneapolis-Honeywell Regulator Co.

During the summer of 1958 leaks were discovered in two 10,000-gallon tanks buried in the earth below floor level of the main plant in Philadelphia. Corrosion caused by chlorides had attacked the outside of the tanks. Some portions had been weakened to such a point that a nail could be pushed through the metal by hand.

The tanks had been installed some 10 years ago when a four-floor addition was made to the existing plant. Their replacement by similar tanks was neither practical nor economical. It would involve extensive building alterations, the transfer of some 80 tons of dies stored in the area, the removal of an additional 900 sq ft of floor as well as serious interference with production.

To minimize these obstacles, the plant engineering department drew up the following three workable solutions:

A. Install a concrete pit and line it with steel.

B. Clean existing tanks, install new tanks in segments inside the existing tanks, and force cement grout between tanks.

C. Clean existing tanks, install 3-in. reinforced concrete liner inside existing tanks.

Of the three solutions, "A" was costliest. However, it was chosen because of the vital nature of the facility and the added protection afforded.

The bay in which tank No. 1 was buried was selected for the new tank location. A portion of tank No. 1 that extended into the excavated area was removed and the end welded back at the edge of the excavation. The old tanks were

Fig. 2. Small "crane" helped in the handling of heavy plates.

Fig. 3. The removable cover slabs were cast on the job site.

then deactivated by filling with concrete.

A 6-in. reinforced concrete slab was poured in the excavation. Walls were constructed of 8-in. solid block and then covered with 4 in. of reinforced gunite cement grout.

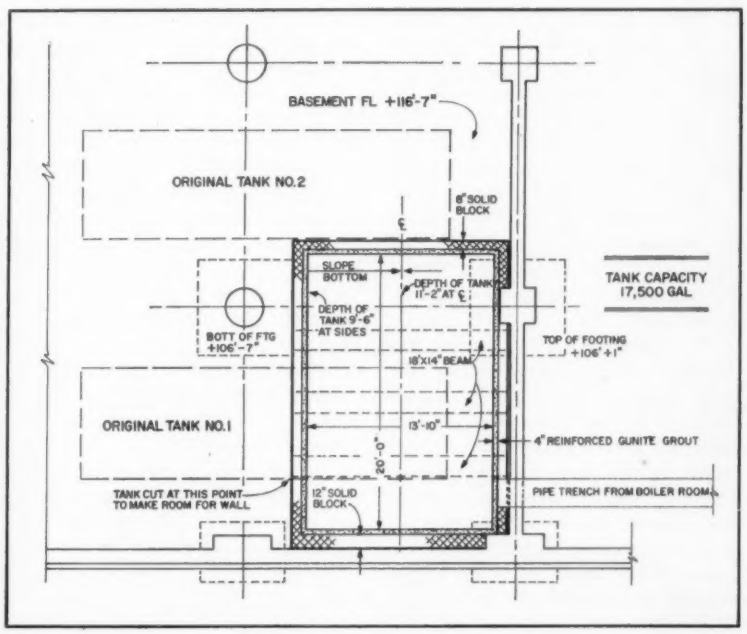
Next, 36 steel plates, each 5/16 in. by 60 in. by 80 in. were positioned by an overhead hoist set up for the job. See Fig. 2. Plates were then tacked into position and welded. Two manholes were cut into the tank at accessible points and stubs for the various service lines were welded into position. After inspection of welded seams to guard against possible leakage, overhead reinforced concrete beams and floor were poured. The concrete beams were designed for 500 lb per sq ft loading.

One end of the floor was built of eight 2-ft by 4-ft removable concrete slabs to provide access to the tank, manhole covers, and piping. A 2-ft by 2-ft concrete trench was provided from the new tank to the boiler room 25 ft away, and covered with steel plates.

This method of on-the-site tank construction saved needless and expensive building alterations and did not interfere with production of industrial process instrumentation. **End**

Fig. 4. Trench houses service piping.

Fig. 5. Plan view of tank installation; end portion of No. 1 tank was cut away.



How to use a RECORD CENTER TO CONTROL SHOP LUBRICATION

By J. C. GILLIBRAND, General Foreman, Maintenance and Construction, Norair Div., Northrop Corp.

SHOP LUBRICATION of machine tools probably is filled with more intangibles than any other maintenance operation conducted by the average plant engineering department. Any indication of adequate and efficient shop lubrication must come from records established over a period of time. So many variables are involved, both from the technical and personnel standpoints, that any attempt to forecast the results of a planned lubrication program may prove very embarrassing to the forecaster.

This is why, at the Norair Division of Northrop Corporation, Hawthorne, California, that portion of the Maintenance Division in charge of shop machine tool lubrication works hand-in-hand with every source of information and control which can be brought to bear upon the various problems involved. This includes production personnel who use the machines, the people who manufacture the machines, the process engineering control laboratories for local evaluation of the lubricating products used, and with all the facilities of a major oil company which supplies the products used.

To make maximum use of this outside aid and information, the data acquired therefrom is coordinated with the lubricating experience of the maintenance department in the department's Master Records Center where a cumulative Master Record Card, Fig. 1, is maintained on every one of the some 1600 major machines in operation at the Norair Division of Northrop.

Each card depicts a complete history of the machine it covers, and a quick perusal of the contents will immediately reveal how various lubricating techniques, frequencies, and the lubricants used have affected that machine's operations.

The Card's the Thing

These Master Record Cards prove useful in many ways. To begin with, they furnish the all-important evidence of past results. This information is extremely useful in the formulation of new lubricating policies, or in the modification of policies to secure equal results at less cost. The same information will indicate faulty lubricating practices which may then be modified in line with requirements.

As an example of this, it had been the practice to drain, clean, and refill machine gear cases once every six months. But the information appearing on the Master Record Cards indicated that such change frequencies were not required. The period of gear case oil changing has now been extended to a year at a considerable saving in time and cost. However, the Master Record Cards are being surveyed constantly to make sure that this extended period does not interfere with machine wear or operation.

This cumulative information has also helped in simplifying and restricting the maintenance department's lubricant inventory. By comparing the results obtained with different lubricants, along with recommendations made by the technical departments of the major oil company supplying our needs, we have been able to cut the number of greases kept on hand from 35 to five more truly "universal" types. This, of course, is exclusive of the highly specialized lubricants required for specific machines. Yet despite this cut in inventory requirements, information on the Master Record Cards reveal that no adverse effects have accrued.

The question may be asked. . . How is such detailed and accurate information accumulated on these record cards?

When a new machine is installed at the Norair Division of Northrop, a Master Record Card is immediately made out to cover it. Initial entries on the card include all data pertinent to that specific machine. If it is a used machine, its condition at the time of installation is noted. Along with this data, a periodic maintenance schedule and a lubricating schedule are entered on the card. The types of lubricants to use are noted, along with the lubricating cycles, and the points on the machine which must be lubricated.

During the establishment of the Record Center (and several times since), a physical survey of all machines in the plant was made. Master Control Cards covering each machine, and containing the above in-

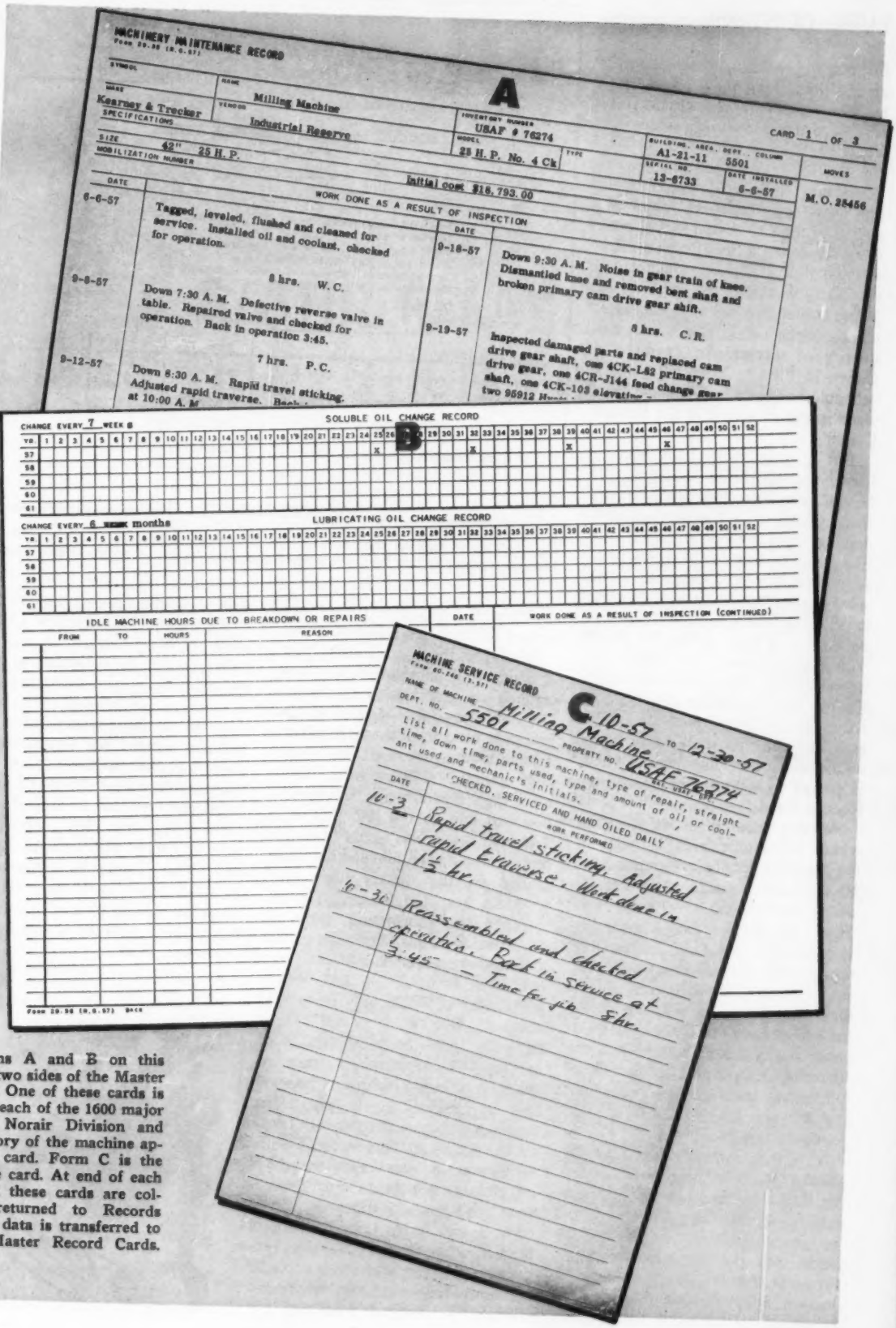

MACHINERY MAINTENANCE RECORD
A
Kearney & Trecker
Milling Machine
Industrial Reserve
USAF # 76274
42" 25 H. P.
25 H. P. No. 4 Ck
A1-21-11 5501
13-6733
6-6-57
CARD 1 OF 3
Initial cost $16,793.00
M. O. 28456
DATE
WORK DONE AS A RESULT OF INSPECTION
6-6-57
Tagged, leveled, flushed and cleaned for service. Installed oil and coolant, checked for operation.
8 hrs. W. C.
9-8-57
Down 7:30 A. M. Defective reverse valve in table. Repaired valve and checked for operation. Back in operation 3:45.
7 hrs. P. C.
9-12-57
Down 8:30 A. M. Rapid travel sticking. Adjusted rapid traverse. Back
9-18-57
Down 9:30 A. M. Noise in gear train of knee. Dismantled knee and removed bent shaft and broken primary cam drive gear shift.
8 hrs. C. R.
9-19-57
Inspected damaged parts and replaced cam drive gear shaft, one 4CK-L82 primary cam drive gear, one 4CR-J144 feed change gear shaft, one 4CK-103 elevating
two 95912
B
SOLUBLE OIL CHANGE RECORD
CHANGE EVERY 7 WEEK S
LUBRICATING OIL CHANGE RECORD
CHANGE EVERY 6 WEEK months
IDLE MACHINE HOURS DUE TO BREAKDOWN OR REPAIRS
FROM
TO
HOURS
REASON
DATE
WORK DONE AS A RESULT OF INSPECTION (CONTINUED)
C
MACHINE SERVICE RECORD
10-57 to 12-30-57
NAME OF MACHINE Milling Machine
PROPERTY NO. USAF 76274
DEPT. NO. 5501
List all work done to this machine, type of repair, straight time, down time, parts used, type and amount of oil or coolant used and mechanic's initials.
CHECKED, SERVICED AND HAND OILED DAILY
DATE
WORK PERFORMED
10-3
Rapid travel sticking, adjusted rapid traverse. Work done 1½ hr.
10-30
Reassembled and checked operation. Back in service at 3:45 — Time for job 5 hr.

Fig. 1. Forms A and B on this page are the two sides of the Master Record Card. One of these cards is made out for each of the 1600 major machines at Norair Division and complete history of the machine appears on the card. Form C is the 60-day service card. At end of each 60-day period these cards are collected and returned to Records Center where data is transferred to the plant's Master Record Cards.

formation and data, were made up at that time. Thus the Record Center now has a complete file of Master Record Cards with which to work.

The Norair Division plan is divided into three separate lubricating areas with machine oilers assigned according to the work load. Once each week the Record Center makes up lubricating schedules for each workshift in each area. These schedules specify the machines to be serviced and the frequency of service. An example is shown in Fig. 2. After the weekly schedule has been fulfilled, the oiler signs it and returns it to the Record Center.

But usually, more than his signature accompanies the card. All Norair oilers are carefully selected, then trained, to act as maintenance division inspectors during their routine oiling operations. If anything is found wrong on a machine, if it seems to be operating at a sub-par level, or if undue wear seems to be occurring, a full report is made. This report is also sent to the Records Center. Then, at the Records Center, all information contained in these reports, along with an indication showing that the weekly lubrication schedule has been fulfilled, is posted to each machine's Master Record Card.

Another source of information which ultimately finds its way to the Master Record Card comes from 60-day service cards, C in Fig. 1, which are mounted on each machine. All service data concerning a machine, including lubrication, repair, downtime, parts replaced, etc., is noted on this card at the time the service is performed. At the end of each 60-day period, these cards are collected, returned to the Records Center, and all the information on each card is posted on the Master Record Card of that particular machine.

It is thus quite evident that the Master Record Card contains all the data concerning a specific machine's service life, including the frequency of lubrication, the repairs made, and the downtime suffered. Frequent spot checks, by both production leadmen and maintenance personnel on the supervisory level, ascertain the authenticity of these reports and fulfilled schedule sheets.

5165
Mech. & Hyd. Week

Preventive Maintenance for Drivmatic Riveters

Weekly Check

1. Hand oil lower ram.
2. Lubricate rivet hopper.
3. Check transfer slides with feeler gage.
4. Check and adjust drill motor belt.
5. Lubricate ways, screws and feeds of tables.
6. Lubricate table gear feed box.

Org. 5568 - Boeing Fus. Sub-Assem.

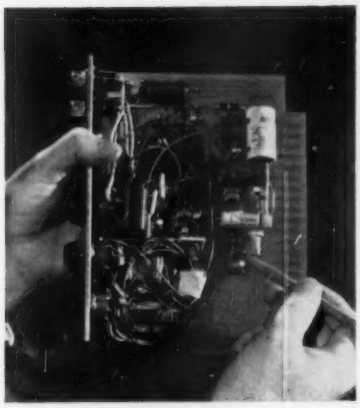
Equipment	Prop. No.	Date	Initial
#1 - Drivmatic Riveter (Mon.)	USAF 29350		
#2 - Drivmatic Riveter (Tues.)	NAI 21624		
#3 - Drivmatic Riveter (Wed.)	USAF 81195		
#4 - Drivmatic Riveter (Thurs.)	USAF 83763		

Fig. 2. This is one of the weekly lube and preventive maintenance schedules. After the schedule has been performed the oiler returns it to the Record Center.

Insofar as the operational aspects of shop tool lubrication are concerned, the practices at the Norair Division are quite similar to the practices used in other large plants. The lubricants required for a specific area are selected from inventory, then placed on a transportation cart and moved into that area. The oiler selects his needs from this mobile stock as he makes his rounds guided by the weekly lubrication schedule from the Records Center.

When the lubrication cycle on any part of a machine extends for a period of more than a week, the operation is noted on the weekly lubrication schedule only when it is required. But this does not relieve the oiler from the responsibility of making a complete maintenance inspection of each machine as he services it, including all lubrication points whether or not they are listed on the schedule. This includes daily inspection of gear cases in which oil changes are made only once a year, and daily inspection of the coolant condition. Usually, coolant is changed once every 7 weeks (except on grinders and other coolant-contaminating machines, where the coolant is changed whenever the daily inspection deems it necessary).

We in the Maintenance Department of the Norair Division of Northrop would be the last to claim we have developed foolproof shop lubrication techniques. Nevertheless, we do think that the use of a Records Center for controlling all shop lubrication, the use of well-trained oilers who can make logical inspection reports to this Records Center, and our close cooperation with all others who have to do with any phase of shop lubrication, give us advantages in ironing out any shop lubrication kinks that do occur before they wrinkle to sizable proportions. **End**



Static overcurrent relay is composed of reliable electronic components assembled on printed circuit base.

STATIC RELAY SOLVES PROTECTION PROBLEMS

SENSING DEVICES commonly employed in today's communication, computer and missile industries, have been put to use by Allis-Chalmers Manufacturing Company, Milwaukee, Wis., in the development of a protective relay that is completely static in operation. The sensing devices incorporated are semi-conductors such as diodes and transistors. These electronic components are combined with conventional circuit elements such as resistors, capacitors and transformers.

All relay component parts are mounted on a printed circuit board, Fig. 1, which is secured to a metal frame. The frame is then filled with epoxy resin and sealed, rendering the relay impervious to moisture as well as making the assembly shock resistant. The epoxy resin case reduces the effect of temperature variations.

Power to operate the relay may be taken from a small auxiliary current transformer shunted by a resistor. Since the power required to operate the relay is less than one-half volt-ampere, it will be advantageous to use small auxiliary current transformers for relaying purposes.

Indication of relay operation is given by a set of small neon lights. They operate in combination with a pair of memory cores that will permit reading the lights at any time subsequent to relay operation. The indication circuit is connected so that one light means time delay operation while two lights mean instantaneous operation.

In order to make the system completely static, a power amplifier is included. This amplifier is designed to take the relay signal and boost the output adequately to handle a circuit breaker trip coil. Only one power amplifier is required per breaker and all static type relays on the circuit feed the same amplifier.

The three dials on the front of the relays, Fig. 2, are the time and range control settings for each phase. These controls adjust the time range and current range within which the inverse-time current unit and the instantaneous current element will function. Adjustments are made by simply setting the knobs to the desired values.

Three of the new relays are mounted in the same housing that would normally house one single phase induction type relay. A complete three phase installation of static relays, Fig. 3, will require about one-third less panel space than relays in use today.

Balancing or calibration of the relay is not required. Technicians familiar with testing and maintaining the induction type relays will find the new static relay easy to handle. No new test equipment or techniques are required.

Present design of these relays includes five taps for the inverse time unit as well as five taps for the instantaneous trip unit. The auxiliary current transformer is designed so that a multitude of ranges is available without altering the basic design of the relay. **End**

Additional Information

If you would like more information about this relay, just write to the Editor, Plant Engineering, 308 East James St., Barrington, Illinois, or indicate "Static Relay" on the post card in this issue.

Adjustments of time delay, inverse time overcurrent and instantaneous trip are easily set with control knobs.

New static protective relay, top of panel, is more compact than previously available electromechanical protection.

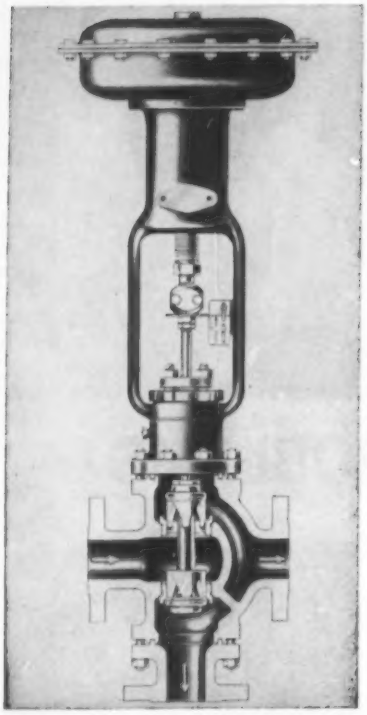


Photo Fisher Governor Co.

Fig. 1. Section of double ported valve body modified for three-way service.

THREE-WAY VALVES

Body Types
Port Characteristics
Applications

By **CHESTER S. BEARD, Chief Engineer, Valve and Actuator Div. General Controls Co., Glendale, California**

USE OF A THREE-WAY valve accomplishes the functions of two straight through two-way valves in most applications. The three-way control valve has three functions. One is to combine the flows through two ports into a flow through a common port. A second is to divide the flow through one port into a flow through each of two ports. The third is to divert the flow into an inlet port to one of two outlet ports.

Body Types. Double-ported bodies (Fig. 1) designed for three-way service use plugs (or guides) seating on the outside of the seat rings. The passage from the lower seat to what is normally an outlet passage must be bridged.

Single-ported bodies (Figs. 2 & 3) require addition of a seat ring in one passageway. The plugs are either between or outside the seat rings. Single-ported valves also can be furnished with a stem guide installed in a web in the lower outlet port insert, although most three-way valves are skirt guided.

Balancing of the three-way valve is accomplished by use of four seats or essentially by combining two double seated valves in one body. Two of the plugs are opening as the other two are closing. The balancing action is the same as occurs in a double-seated control valve.

Another three-way design has been developed for production and test control of oil wells. Figure 4 shows this three-way, three-position valve. The lower port is opened by lifting the stem; the upper port is opened by pushing the stem; while both ports are closed by the spring when force is released from the stem.

For oil production, a timer may operate one pump of a dual electro-hydraulic actuator, or a solenoid to allow pressure to a balanced diaphragm actuator to open the upper port. This will allow well production

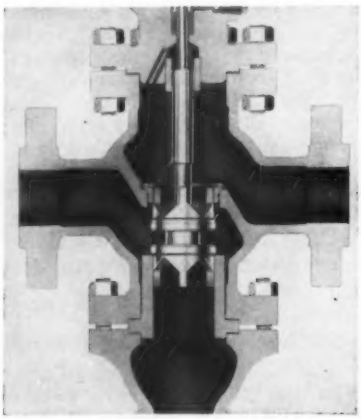
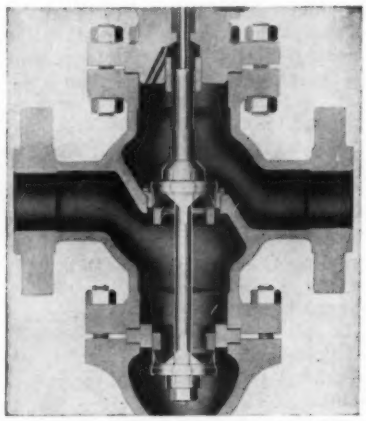
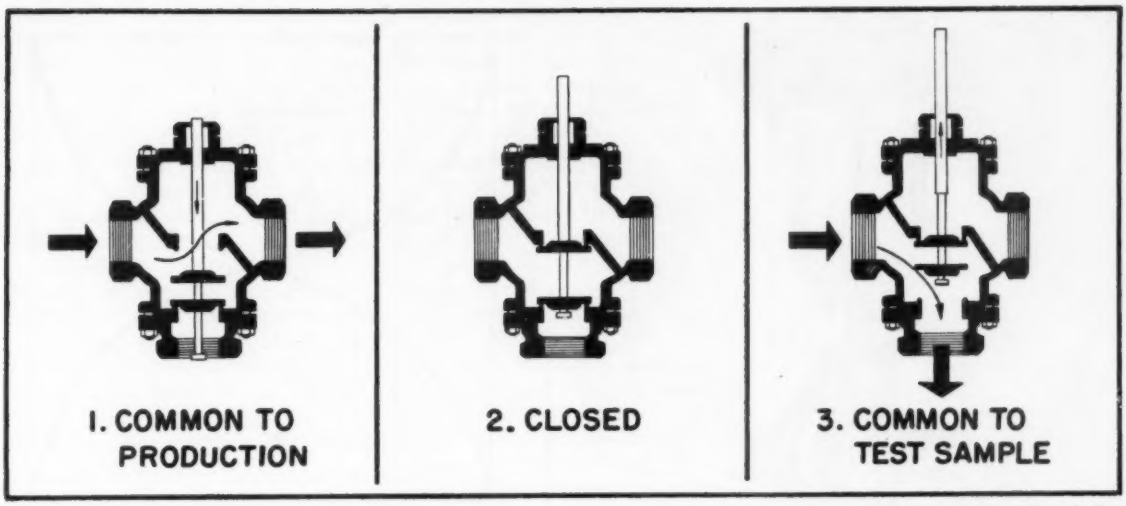


Fig. 2. Cutaway of a modified single seated valve fit for flow splitting.



Photos Hammel-Dahl, Div. Gen. Controls Co.

Fig. 3. Section of valve good for flow blending. Body type, same as at left.



Courtesy General Controls Co.

Fig. 4. Three-way valve with three positions. By lifting stem the bottom port opens, by pushing it the top port opens.

to flow to storage for the period dictated by the timer. At the end of this period, de-energizing the pump or solenoid will close the well production port and the lower port remains closed.

Upon contact of the timer, the pump or pneumatic pressure under the diaphragm opens the lower port to allow flow to the test installation. A test installation for this use is designed to measure oil flow rate, gas flow rate, gravity and water content. At the end of the test period, the test port is closed by breaking the contact on the timer. Both ports are held closed by well pressure. High well pressures require these valves to have high pressure rating, but have very small ports. The high pressure drop allows the required flow rate through a small seat ring.

Port Characteristics. Quick opening of ports is accomplished by using the poppet or beveled plug. Full flow through either port occurs with travel of the stem equal to one fourth the diameter of the port. Thus, stem travel is much less than required when using a port contoured to give equal percentage or some other flow characteristics.

Interflow between ports occurs in the open center type. This condition is minimized by using the closed-center design. The shoulder extending from each beveled plug limits flow during stem movement until the shoulder moves out of the seat. Both open and closed center types provide tight shut-off.

The ports of either the single or double seated type three-way bodies may be characterized. The portings are always oriented so that one is allowing small flow while the other is at the point of largest opening.

In the case of the double-ported

Fig. 5. Flow vs stem travel curves for a flow splitting valve.

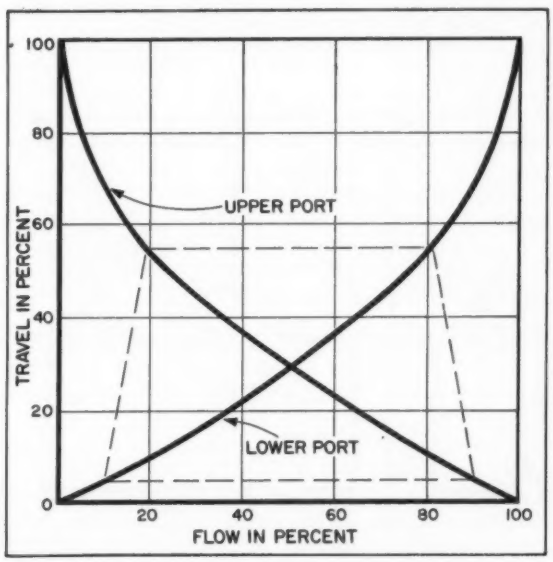
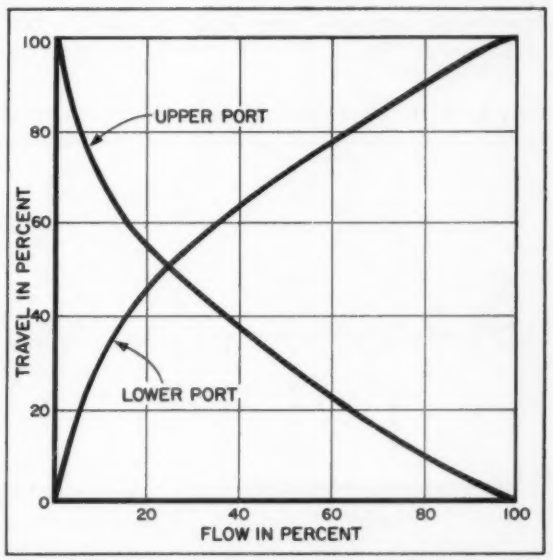


Fig. 6. Total flow varies as one port closes, another opens.



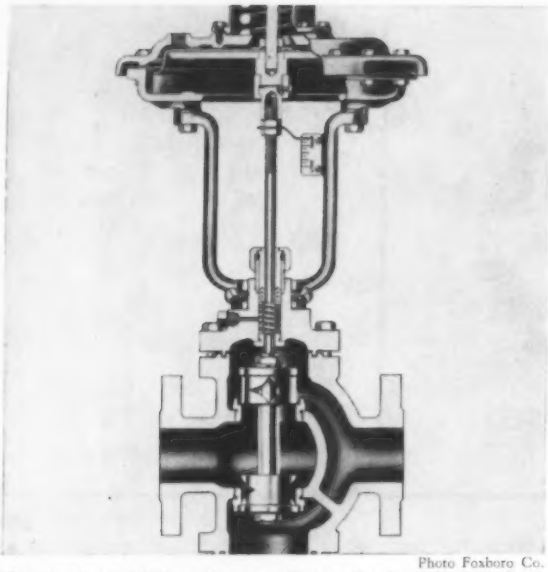


Photo Foxboro Co.

Fig. 7. Asteroid-shaped ports effect refined control of flow.

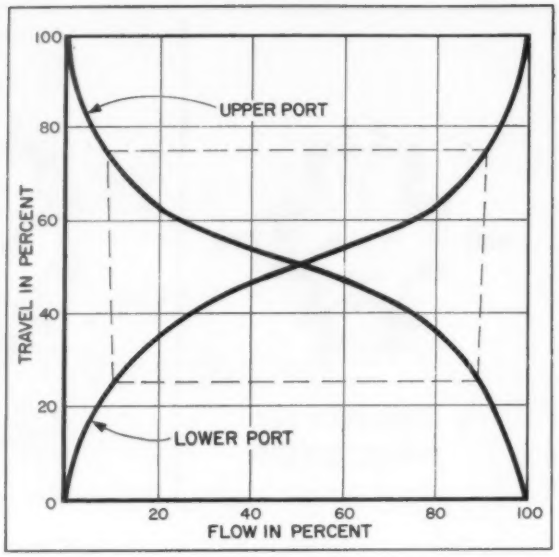


Fig. 8. Characteristic curves for flow through asteroid ports.

three-way body for flow splitting, the flow would be from the inside of the shell of the valve plug, through the "V" openings to the discharge passages. The characteristic of each port would be similar to a single-seated V-ported valve assuming a constant pressure drop across the port.

As the stem moves down, the upper port will close (Fig. 5) and the lower port will open. At some point the flow through each port will be equal. At other stem travels the combined flows will remain constant. This allows the three-way valve to handle a constant flow rate to the valve, although the divided flows to the discharge ports vary with stem position.

This constant port area allows the valve to maintain a constant discharge rate when used for mixing. In this mixing application there are two inlet ports with flow from the outside of the "V" ports to the common discharge.

Single-seated three-way bodies with "V" ports will allow large flow through one port while small flow occurs through the other port. This use of the "V" port will cause a throttled change in the flows but in this case, the total flow (Fig. 6) does not remain constant.

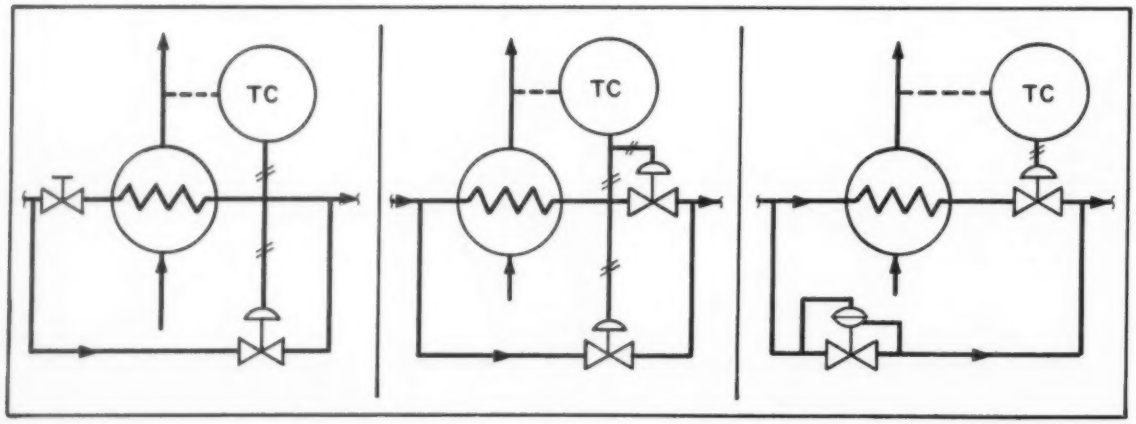
Use of a modified diamond or asteroid shape (Fig. 7) results in very useful flow characteristics through the two ports. Equal areas of the upper and lower ports are uncovered at 50 per cent stem travel so that the flows are equally divided assuming the pressure drops across each port are equal.

The flow characteristics (Fig. 8) show that as the upper port opens, the equal-percentage relationship occurs through the first half of the travel. During this travel, the lower port is opening to cause a complementary flow so that the total of the two flows is always equal at any stem position.

This condition continues beyond the 50 per cent stem travel because the lower port closes to cause an equal-percentage relationship while the upper port is opening to allow complementary flow.

It is wise to design systems which

Figs. 9, 10, 11. Three different setups for the control of the temperature of the effluent leaving a heat exchanger.



require flow splitting so that the stem travel is about plus or minus 25 per cent relative to the midpoint of stem travel. A rectangle constructed upon these limits shows flow relationships for the 25 per cent stem movement in each direction from the midpoint. These characteristics are conducive to successful coordinated control.

A different relationship occurs between the flows through a double-seated "V" port type valve as the stem moves in different directions from its midpoint. Acceptable control is, nevertheless, obtainable because the total flow through the two ports remains constant.

Use of Three-Way Valves. Diverting services are innumerable. An example is the diversion to waste of condensate from a heat exchanger: Suppose hot condensate is used in a pulp mill to heat a caustic stream which flows at a higher pressure than the pure condensate. If a leak into the pure condensate should occur, it can be sensed by a pH alarm which can cause the spilling of the polluted condensate through the operation of a three-way valve.

The three-way valve can be positioned by expansion of the liquid or gas of a thermal system. This valve is used extensively for engine water temperature control. The temperature element placed in the cooling water flow from an engine will close the bypass port on increase in temperature. Upon decrease in temperature, more warm water from the engine will be bypassed to mix with the incoming cool water.

Use of the three-way valve body becomes important in heat exchanger control. A resume of the use of two-way valves for this service will allow comparison with the three-way valve to accentuate the advantage of the latter. Control of the temperature of an effluent from an exchanger may be accomplished by regulating the flow through the bypass. See Fig. 9. This system is advantageous when the bypass flow is less than about 25 per cent of the total flow. With the valve and the tubes of the exchanger in parallel the pressure drop across each is equal. As the flow through the control valve increases, the pressure drop available decreases so that flow rate reaches a limit which is the 25 per cent stated.

Addition of a control valve in the exchanger line refines the control. The action of each valve (Fig. 10) is in opposite directions. With one opening as the other closes, the one controller may be used. Use of a differential pressure regulator in the bypass (Fig. 11) maintains a constant drop allowing the control valve to produce the required ratio by introducing resistance in the exchanger line.

The control functions depicted using two valves may be obtained with a three-way valve with the expected economy. Three factors of system design offer choices: 1. Placing the valve in the upstream or downstream of the exchanger. 2. Use of a single-seated or double-seated three-way valve. 3. Piping for exchanger flow through the upper port or the lower port. Four systems are shown in Figs. 12, 13, 14 and 15 utilizing the most acceptable flow pattern for the type of valve to be used.

Stabilizing Unbalance

Bypass flow is in series with the lower port in Fig. 12 and in series with the upper port in Fig. 13. In each case the greatest unbalance at any point in the valve is across the bypass port when this port is nearly closed. Use of a direct-acting diaphragm actuator will supply the needed force for stable action in Fig. 12, while a reverse-acting type is indicated in Fig. 13. (Note top arrow). Selection of the actuator becomes secondary when it is of the springless diaphragm type used with a positioner of the electric gear type which inherently minimizes the effect of valve unbalance.

The double-seated valve (Fig. 14) is upstream and the bypass flow is through the lower port. Greatest unbalance in either direction occurs as the plug approaches the closed position. In each case the unbalance tends to open the port.

For this installation a reverse-acting diaphragm actuator is indicated. When the bypass flow is through the upper port, (Fig. 15), flow through this port creates the greatest unbalance so a direct-acting actuator is used. Use of asteroid port configuration would be advantageous for application in systems shown in Figs. 14 and 15. **End**

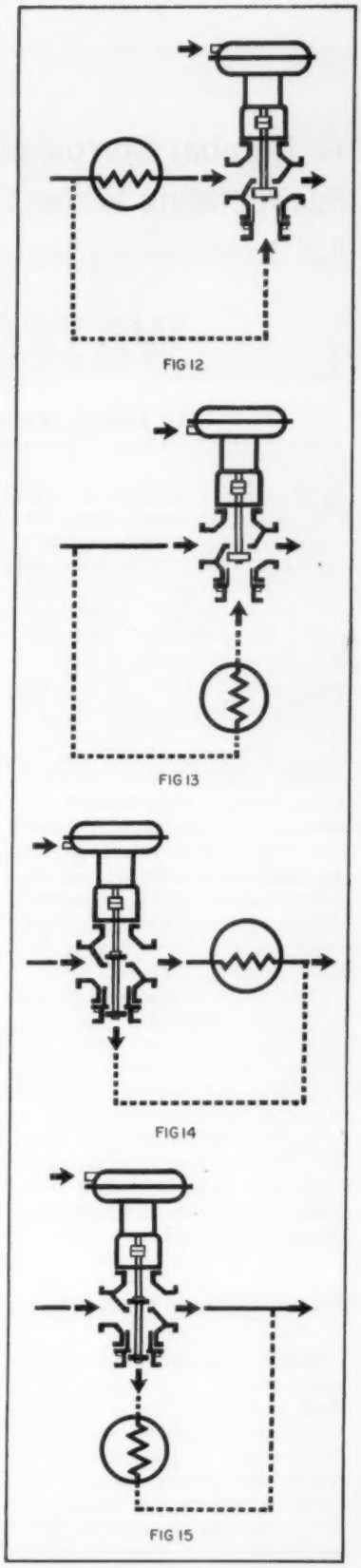


FIG 12

FIG 13

FIG 14

FIG 15

To Combat Corrosion and Scale in Recirculating Water Systems of Air Conditioning Installations, Here's a Must—

WATER TREATMENT CONTROL

By JOHN R. SCHIEBER, Engineering Dept., Betz Laboratories, Inc., Philadelphia, Pa.

AIR CONDITIONING units with open recirculating water systems are difficult to protect properly and economically from scale and corrosion because of inaccessibility and the amount of attention required. Both continuous blowdown and continuous chemical feed are essential to satisfactory results and economical use of chemical treatment.

The water from all supplies, whether cooling towers, evaporative condensers, or air washers, contains varying amounts of dissolved salts. The most prevalent salts are the bicarbonate, chloride and sulfate salts of calcium, magnesium and sodium. Open recirculating cooling water systems achieve their cooling by evaporation of water.

Pure water is continuously lost to the atmosphere and is automatically replaced in the system with "impure" makeup water, usually through a float valve in the basin or pan of the air conditioning unit. It can be seen that salts are introduced and remain to accumulate. Ultimately, scale formation must occur as the limits of solubility of the salts are exceeded.

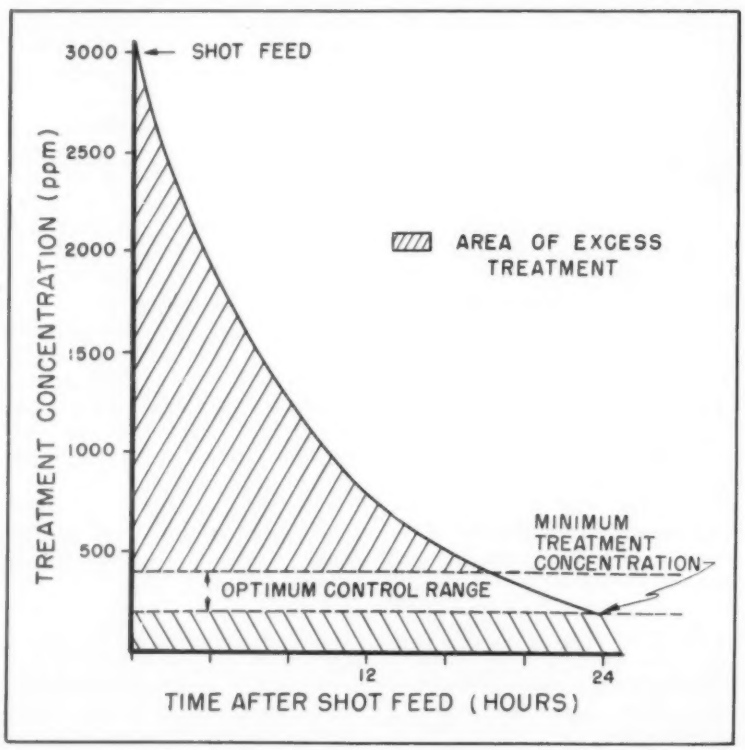
Preventing Scale Formation

Usually, calcium carbonate (calcium carbonate occurs commonly as chalk or limestone and is identified chemically as $CaCO_3$) will be the first material to precipitate in the system and this precipitation will occur initially at the hottest section of the system, such as in the water side of the tubes of the condenser in a Freon system. This scale accumulation reduces heat transfer with resulting inefficient operation and decreased capacity.

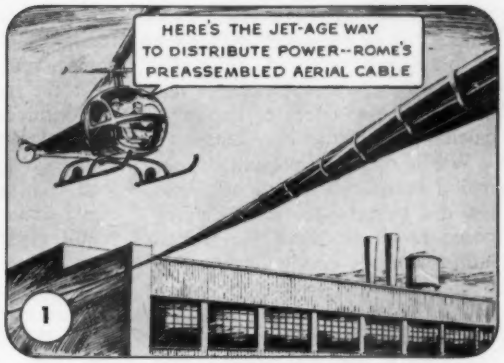
The simplest and most direct means of preventing scale formation is to provide continuous blowdown of the recirculating water to sewer. This prevents salts from accumulating excessively. The amount of blowdown required will depend upon the amount of solids in the water used as makeup, but the average blowdown needed is one-third to one-half as much water as is added to the system. If excessive concentration of salts were to be prevented by dumping and refilling, the operation would be required at least every 9 hours of operation for the average unit.

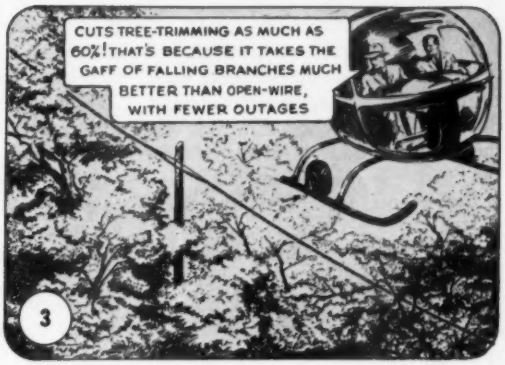
There are chemical materials, such as the complex phosphates, which minimize scale by an effect of increasing the solubility of such scale formers as calcium carbon-

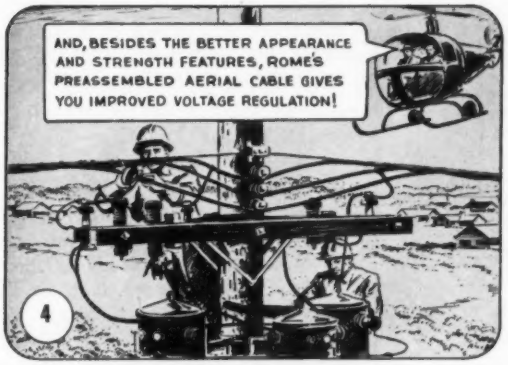
Fig. 1. Diagram illustrates how chemical treatment is wasted with shot feeding.



WHAT'S UP IN AERIAL POWER?




CUTS TREE-TRIMMING AS MUCH AS 60%! THAT'S BECAUSE IT TAKES THE GAFF OF FALLING BRANCHES MUCH BETTER THAN OPEN-WIRE, WITH FEWER OUTAGES
3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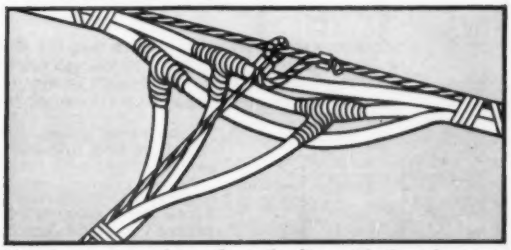

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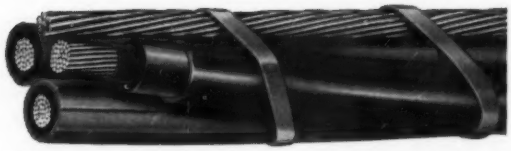

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ate. These chemicals are of limited ability, however, and their chief function is in reducing the amount of blowdown required. Indiscriminate use of polyphosphates can have a reverse effect of depositing calcium phosphates in a system.

When scale is prevented, corrosion becomes the primary problem due to metal surfaces being exposed to attack. Since the recirculating water is continuously mixed with air in the cooling process, it will be saturated with oxygen and will be highly corrosive. Control of corrosion is most effectively accomplished by continuous application to the recirculating water of one of the chemical corrosion inhibitors such as a chromate or a nitrite.

These materials do not react with or neutralize the oxygen but instead develop an invisible film on the metal surfaces which interferes with the corrosion mechanism. This film is fragile and of a temporary nature so that it is necessary to maintain treatment in the cooling water at all times. In addition, the effectiveness or "thickness" of the film will be in direct relation to the amount of treatment in the water so that it is necessary to maintain a certain minimum concentration of chemical treatment. Treatment level in air conditioning units ordinarily will be in the range of 100—600 ppm.

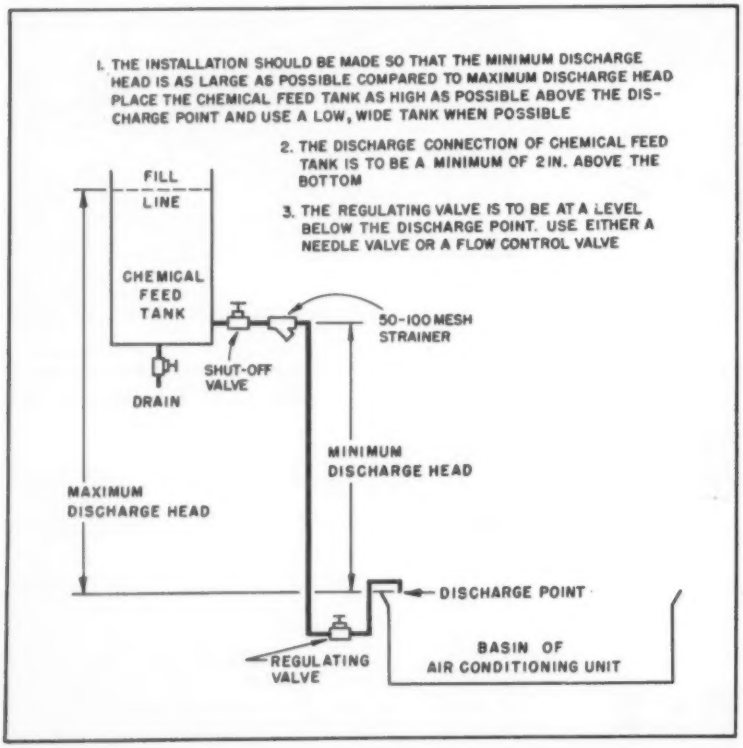
Continuous blowdown is necessary to prevent scaling and, correspondingly, continuous chemical feed is necessary to maintain adequate treatment levels. This second requirement is amplified by the design of air conditioning units in that they usually contain little water compared with the amount of water that is added to them in a day. Thus, if treatment is shot-fed once per day, it must be fed far in excess of its required treatment level if the minimum treatment concentration is to be maintained until the next shot feed.

Figure 1 illustrates the rate of decrease in treatment concentration under average conditions with continuous blowdown. It will be seen that a shot feed of 3000 ppm must be made in order that there will still be a minimum concentration of 200 ppm at the end of 24 hours. If treatment were to be maintained within the normal limits of 200—400 ppm at all times, shot feed every six hours would be necessary. More than three times as much treatment is required when shot feeding once a day as when treating continuously, in order to maintain the same protection.

There are a variety of devices used for continuous chemical feed. One of the simplest is a drip feeder —a chemical solution tank with a valved discharge line at the bottom. The treatment is dripped into the sump or pan of the air conditioning unit by adjustment of the valve. This feeding device is seldom entirely satisfactory; plugging of the valve occurs, there is difficulty in properly adjusting the valve, and the rate of flow decreases as the tank empties.

When such feeders are used, it is advisable to make the installation so that the regulating valve is always flooded and the tank raised as high as possible with respect to the valve (see Fig. 2).

Fig. 2. Diagram illustrates desirable arrangement for a drip feeder installation.


1. THE INSTALLATION SHOULD BE MADE SO THAT THE MINIMUM DISCHARGE HEAD IS AS LARGE AS POSSIBLE COMPARED TO MAXIMUM DISCHARGE HEAD PLACE THE CHEMICAL FEED TANK AS HIGH AS POSSIBLE ABOVE THE DISCHARGE POINT AND USE A LOW, WIDE TANK WHEN POSSIBLE
2. THE DISCHARGE CONNECTION OF CHEMICAL FEED TANK IS TO BE A MINIMUM OF 2 IN. ABOVE THE BOTTOM
3. THE REGULATING VALVE IS TO BE AT A LEVEL BELOW THE DISCHARGE POINT. USE EITHER A NEEDLE VALVE OR A FLOW CONTROL VALVE
FILL LINE
CHEMICAL FEED TANK
50-100 MESH STRAINER
SHUT-OFF VALVE
DRAIN
MINIMUM DISCHARGE HEAD
MAXIMUM DISCHARGE HEAD
DISCHARGE POINT
BASIN OF AIR CONDITIONING UNIT
REGULATING VALVE

Other Methods

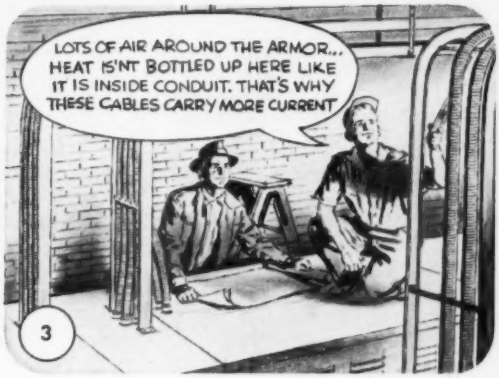
The use of a pump is a second common method of providing continuous feed. Chemical feed pumps are quite dependable but some types present problems in regulation and maintenance. Piston type pumps are prone to some leakage which can be particularly objectionable when feeding colored materials such as chromate.

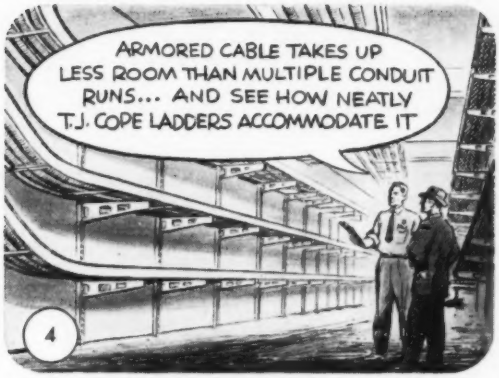
One device developed specifically for adding treatment to air conditioning units, is a gravity feeder. This feeder is essentially an electrical device which feeds chemical solution by gravity through an arrangement of solenoid valves. The feeder most frequently is connected electrically with the water circulating pump so that feed is proportional to time of operation of the air conditioning unit. Also, as illustrated in Fig. 3, bleedoff is taken from the discharge side of the water pump in a manner such that blowdown occurs while the unit operates.

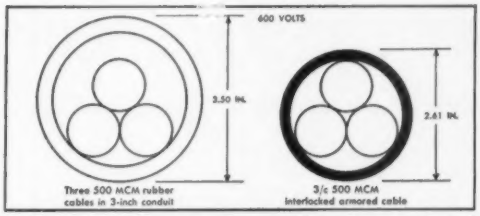
Treatment is fed every 15 minutes so that feed is practically continuous. Chemical solution flows from the tank through a solenoid and into the measuring tube (Fig. 3). The liquid level rises in the tube until it contacts an adjustment rod which closes the first valve. This

(Turn to page 150)

ROMAN ARMOR'S BEST...


LOTS OF AIR AROUND THE ARMOR... HEAT IS'NT BOTTLED UP HERE LIKE IT IS INSIDE CONDUIT. THAT'S WHY THESE CABLES CARRY MORE CURRENT
3





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Water Treatment—

(from page 148)

operation is dependent upon the electrical conductivity of the feed solution. A second solenoid valve then opens to drain the tube and after an interval of time the second valve closes, the first valve again opens, and the cycle is repeated. The rate of feed is adjusted by raising or lowering the adjustment rod. There is no measurable variation in the rate of feed and capacity adjustment is from 0 to 0.44 gph.

Although the gravity feeder takes its electrical current from circuits operating on 110 v or higher, it incorporates a step-down transformer. All electrical components in the feeder operate on 24 v so that there is no shock hazard and components other than the solenoid valves are housed in a moisture proof enclosure. Power requirement is less than 25 w.

The 15-gal chemical solution tank supplied with the feeder has a capacity of 25 to 100 lb of chemical treatment, depending upon the type of treatment and strength of the feed solution. Used with the average air conditioning unit, the tank requires charging at intervals of once or twice per month. Capacity of the tank and feeder is sufficient to treat water in air conditioning units of approximately 400 tons.

The feeder can be easily altered to feed two materials, such as a corrosion inhibitor and slimicide, in proportion from two tanks. Quite often, such chemical treatments are not compatible so that this elaboration is necessary. **End**

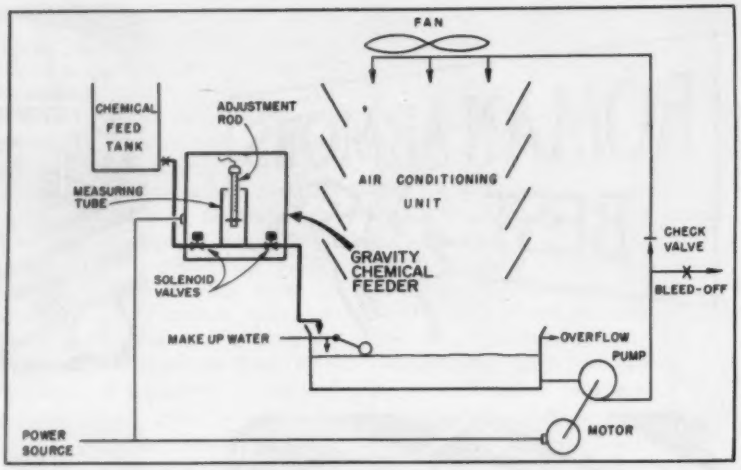


Fig. 3. Treatment and blowdown control with gravity feeder mechanism detail.

BATTERIES "CLOCKED" FOR EFFICIENCY

By GEORGE NEMPHOS, Supv. Plant Engineering & Maintenance Dept., The Martin Co., Baltimore, Md.

A TIME CLOCK in a battery maintenance shop may seem as out of place as the proverbial pig in the parlor, but with 150,000 dollars worth of industrial batteries to be maintained, a time clock can appreciably extend the life of these batteries.

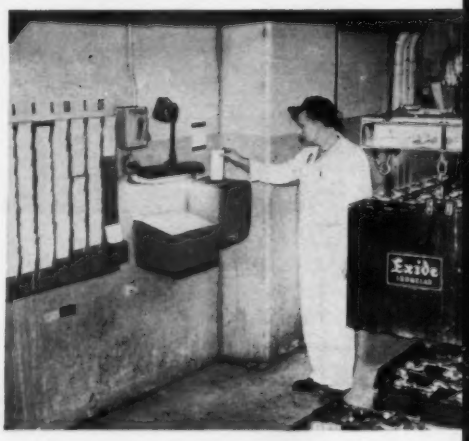
Each battery at the Martin-Baltimore plant has a time card with its number stamped on it. When a battery comes into the shop for recharging, the shop attendant takes the card with the number corresponding to that on the battery and clocks it in. He then measures the specific gravity and marks this on the time card. The battery is placed on the rack and the automatic charger turned on.

When the charge is completed the charger automatically turns off and the attendant measures the specific gravity again and marks this on the time card and clocks it out. Now the battery is ready to go back into service and all the pertinent information is recorded on the time card. Once a week each battery receives a normalizing charge which is also recorded on the time card.

The card is divided so it will hold the record of a battery for a month's operation. After it is full the information is transferred to the permanent file that is kept on each battery.

This record affords the attendant the information necessary to get the greatest utilization from each battery. The length of time the battery is on the charge rack and the amount the specific gravity is raised tells the attendant the condition of the battery and where it will operate most efficiently. With this knowledge he is able to put the best batteries in the trucks that have the heaviest work load, thus extending the useful life of all the batteries.

In addition to the saving in time, brought about by the increased efficiency these cards provide, there is also the advantage of having a running inventory of the batteries. From this information can be determined what portion of the expected life remains and how soon a replacement must be ordered. **End**



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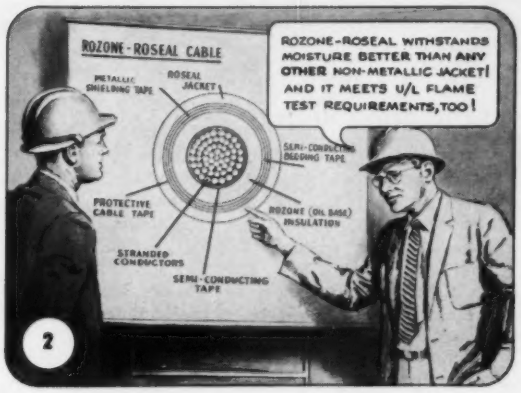
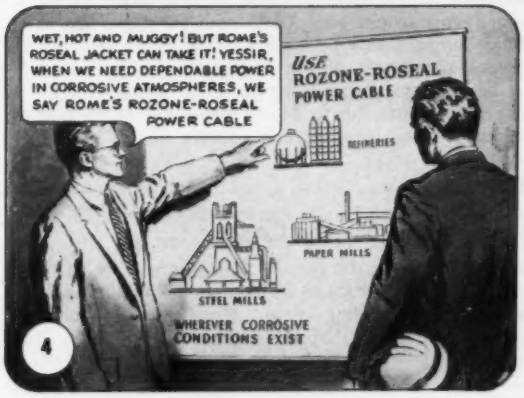
1




WET, HOT AND MUGGY! BUT ROME'S ROSEAL JACKET CAN TAKE IT! YESSIR, WHEN WE NEED DEPENDABLE POWER IN CORROSIVE ATMOSPHERES, WE SAY ROME'S ROZONE-ROSEAL POWER CABLE
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For more facts circle 718 on Reply Card

Electrostatic Collectors Pass Test—To Control Open Hearth Dust

CONSTRUCTION OF major equipment for air pollution control will equip Jones & Laughlin's No. 4 Open Hearth shop with electrostatic precipitators, the most modern equipment for dust collecting. The installation, to be made on Pittsburgh's South Side, will cost approximately nine million dollars.

This latest phase of J&L's program of smoke abatement at the Pittsburgh works was initiated with the operational testing of a one-million-dollar unit attached to one of the open hearth furnace stacks. The construction program will add dust collecting equipment to all of the 11 furnaces in the open hearth building.

In the operation of the precipitators, gases and the dust particles they carry from the open hearth furnaces are cooled and then passed through the high-voltage field of the precipitator. An electric charge is impressed on the particles, and they are attracted to a large plate which

carries an opposite charge, while the gases continue up the stack. The dust is then collected from the plate by mechanical means.

Ditcher Takes Big Bites of Texas Soil To Speed Irrigation Project

IN THE RIO GRANDE VALLEY of Texas, a giant ditcher is setting new records in irrigation system construction. Manufactured by Gar Wood-Buckeye, the 55-ton machine

digs trapezoidal irrigation canals, in widths up to 22 feet.

Most of the work being done involves rebuilding an existing irrigation system, originally installed 50 years ago. Old dirt canals are torn out, elevated levees are rebuilt and compacted, then the new ditch is excavated and lined with concrete.

The ditcher excavates these new canals at an average speed of seven feet per minute. Under full work load, it will excavate up to 800 cubic yards of dirt per hour.

A concrete boat, or slip form, is attached to the ditcher by a cable, providing an effective method of excavating and lining simultaneously. Concrete is brought to the job in ready-mix trucks and placed with the slip form as the ditcher moves along the levee.

Quick conversion of the ditcher is possible, so that it can be used to dig pipeline or sewer ditch. It can dig straight-wall ditch up to 5½ ft wide and 11 ft deep. In this service, the machine can operate up to 35 feet per minute.

Controlled Atmosphere Hardening Furnace for Missile Motor Cases

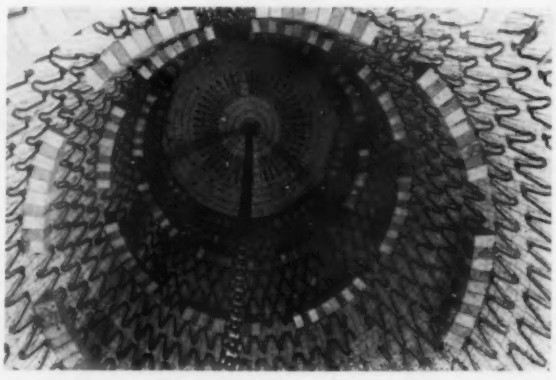
A NEW GANTRY TYPE controlled atmosphere hardening furnace, with atmosphere quench for hardening rocket motor cases and aircraft components, went into operation at Lindberg Steel Treating Co., Chicago, in March. It is large enough to handle the rocket motor case of the "Minuteman" intercontinental ballistic missile.

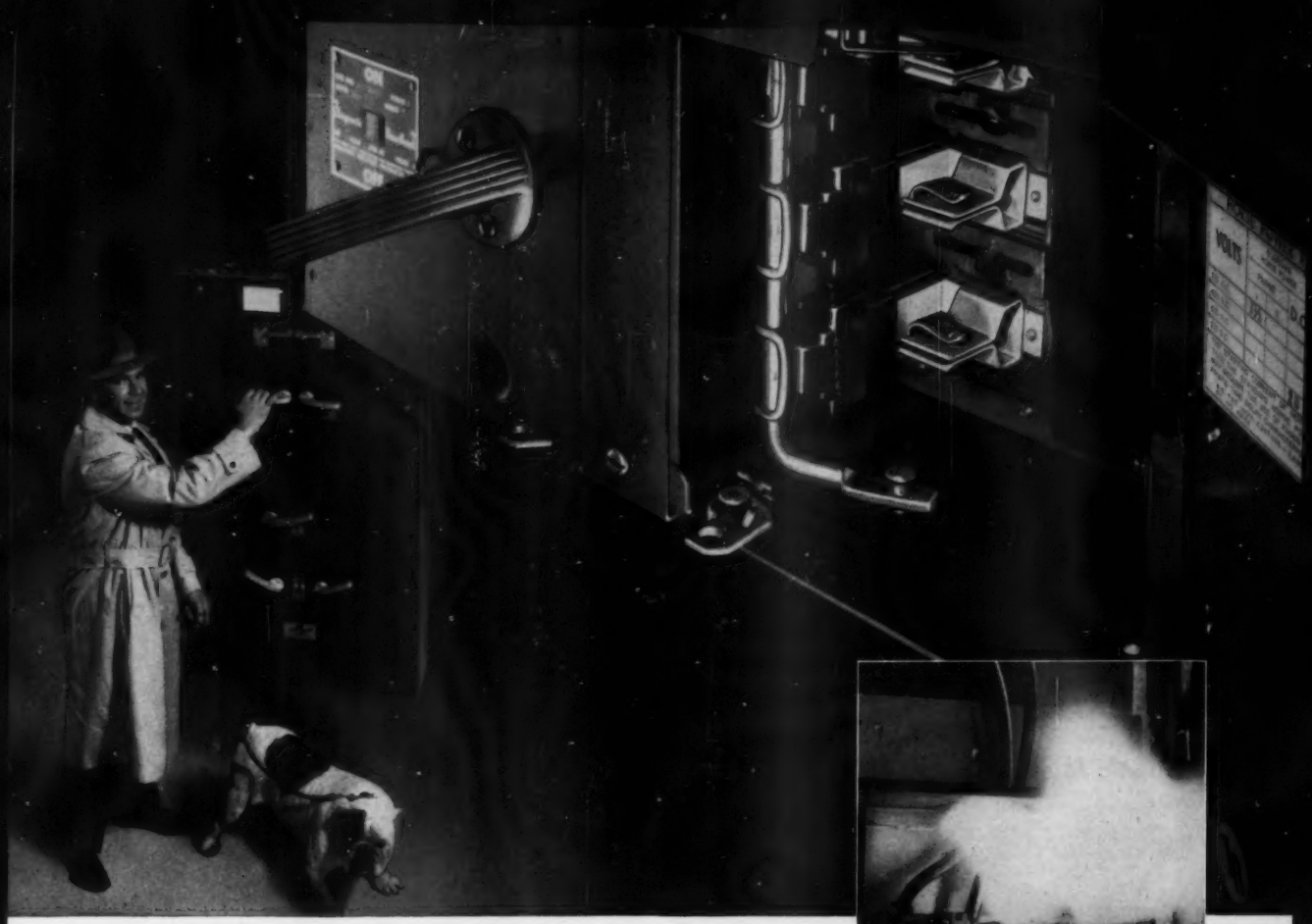
The hardening furnace and associated equipment can accommodate a loading fixture with an effective work load 80 in. in diameter by 288 in. in length. It is electrically heated, has five control zones and operates between 250 F and 2050 F.

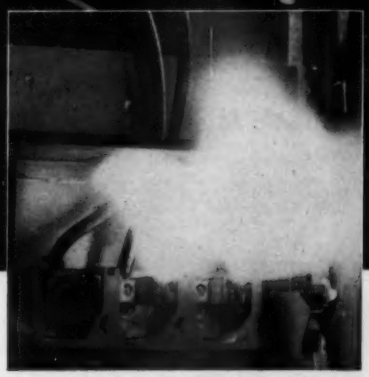
The work load is lifted into the furnace by a two-speed winch, fitted with a 42-ft-long alloy chain.

The furnace, which rolls on wheels along tracks that straddle a large pit, is both bottom loading and bottom quenching. The pit, 19 ft wide by 28 ft deep by 55 ft long, houses the loading station, atmosphere quench tank, salt quench tank, and water wash tank. A 6000 cu ft per hour endothermic gas generator supplies atmosphere gas to the hardening furnace.

The work chamber of the furnace is lined with a lightweight insulating refractory supplied by the Armstrong Cork Co., through the Illinois A. P. Green Fire Brick Co. This refractory is backed by courses of medium and low temperature insulating slabs. Nearly 10,000 nine-inch tailor-made wedge shaped bricks were used in lining the furnace.







Dangerous flash explosion occurs at instant of "break" in open knifeblade switch . . . causing blades to burn, pit, deteriorate. (This photograph and the one below are unretouched.)

FOR SAFETY'S SAKE, BUY VACU-BREAK POWER PANELS

Here are some basic facts why BullDog Power Panels with Vacu-Break* units are tops in safety and performance. Vacu-Break design minimizes destructive arcs because contacts are housed in compact chambers that extinguish the arcs immediately. Result: maximum safety . . . virtually no pitting or burning of contacts . . . minimum maintenance. Vacu-Break switch units are "quick-make, quick-break" with an interlocking safety mechanism. Contacts are *directly* attached to operating handle. No tricky toggles or springs. You get positive, safe switching always. And when the handle is in OFF position, you *know* the switch is *off!*

The Clampmatic* design provides clamped-pressure switching contacts to prevent overheating at these points. Needless heat-generating areas are eliminated because there are no hinged, current carrying parts . . . and all conductors are silvered. BullDog switches also withstand severe fault currents. In recent tests, standard BullDog switches with Amp-Traps** were subjected to a 100,000-amp short circuit current. *They were undamaged!*

For safety's sake—and superior performance—specify BullDog Vacu-Break Power Panels

BullDog Vacu-Break chamber smothers arcs before they can cause damage. Both are 100-amp, 600-volt switches, operating under 90-ampere, 440-volt load with 40% to 50% power factor.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

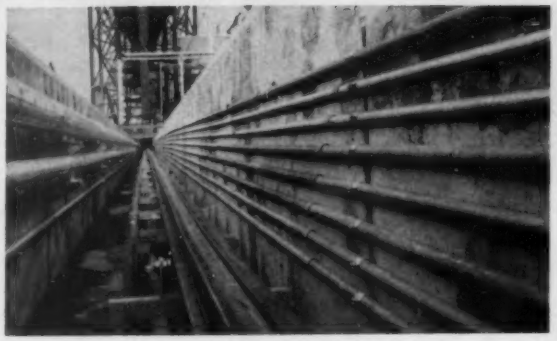
*Vacu-Break and Clampmatic are registered trademarks of the BullDog Electric Products Division. **Amp-Trap is a registered trademark of the Chase-Shawmut Division.

For more facts circle 566 on Reply Card

Zipper Conveyor Belt Carries Carbon Black from Rail Car to Silo

FACILITIES FOR large volume production of a new man-made cold rubber containing carbon black particles intimately and uniformly mixed with the rubber molecules have been placed on stream by Goodrich-Gulf Chemicals, Inc., at its Port Neches, Texas plant. The new equipment is designed to produce 15 million pounds of black masterbatch per month on a continuous-flow basis.

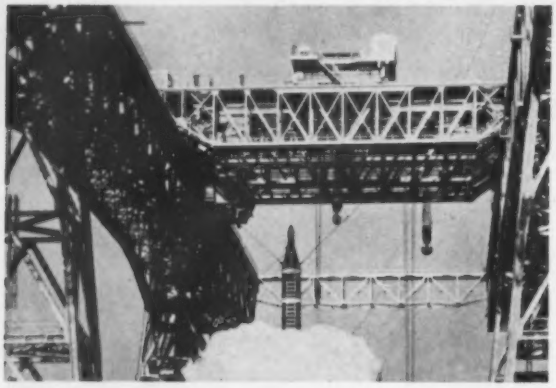
A feature of the Port Neches installation is the handling equipment for the large amount of carbon black required for the operation. Delivered to the plant in railroad hopper cars, this powdery material is discharged from the bottom of the hopper cars, through a fabric chute into a unique zipper belt conveyor. This conveyor, which runs under the rail siding, is a product of B. F. Goodrich. It is automatically closed into a tube by rubber zippers, as it leaves the unloading zone. Traveling in a trench, the belt moves to storage silos where the zippers open and the carbon black is discharged. The belt is more than 500 ft long, and is rated as one of the largest installations of its type yet installed.



The carbon black is fed from the silos by screw conveyors to automatic measuring equipment, then reduced in special equipment into tiny, uniform particles. These particles are slurried, then hydraulically injected into a turbulent stream of liquid rubber. Here, the addition of an acid coagulant blends the two components completely.

Realistic Missile Testing—Operation Skycatch Brings 'em Back Alive

NEWEST PHASE OF DEVELOPMENT TESTING of the launching system for Polaris, the Navy's submarine-launched ballistic missile—"Operation Skycatch"—catches multi-ton, full-scale dummy missiles in mid-flight.



The test program is being carried on at the San Francisco Naval Shipyard, as a joint effort of the Westinghouse Electric Corporation, Lockheed Missiles and Space Division and Navy Personnel.

Tests preceding Skycatch included the firing of redwood logs, then concrete-filled dummy missiles from launching tubes into San Francisco Bay.

To recover dummy—but structurally identical—metal missiles, a recovery technique was evolved, to catch each test missile in mid-air.

The method was devised by the Navy Aeronautical Engineering Facility at Philadelphia. Overhead cranes, towering high above the launching tube, are fitted with a modified arresting gear engine, of the type used to control aircraft landings on aircraft carriers.

Cables hanging from these cranes are attached to the test missiles before firing. As the missile is launched and reaches its highest point, the cables are reeled in to put on tension and to stop the flight. The vehicle is then lowered to the ground for checking and removal of tapes recording launching data from instruments carried inside the missile.

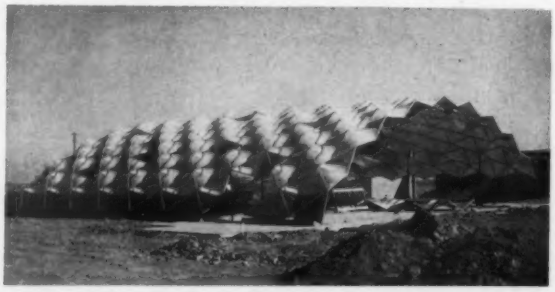
Plastics Fabricator Builds Its Plant With Its Own Products

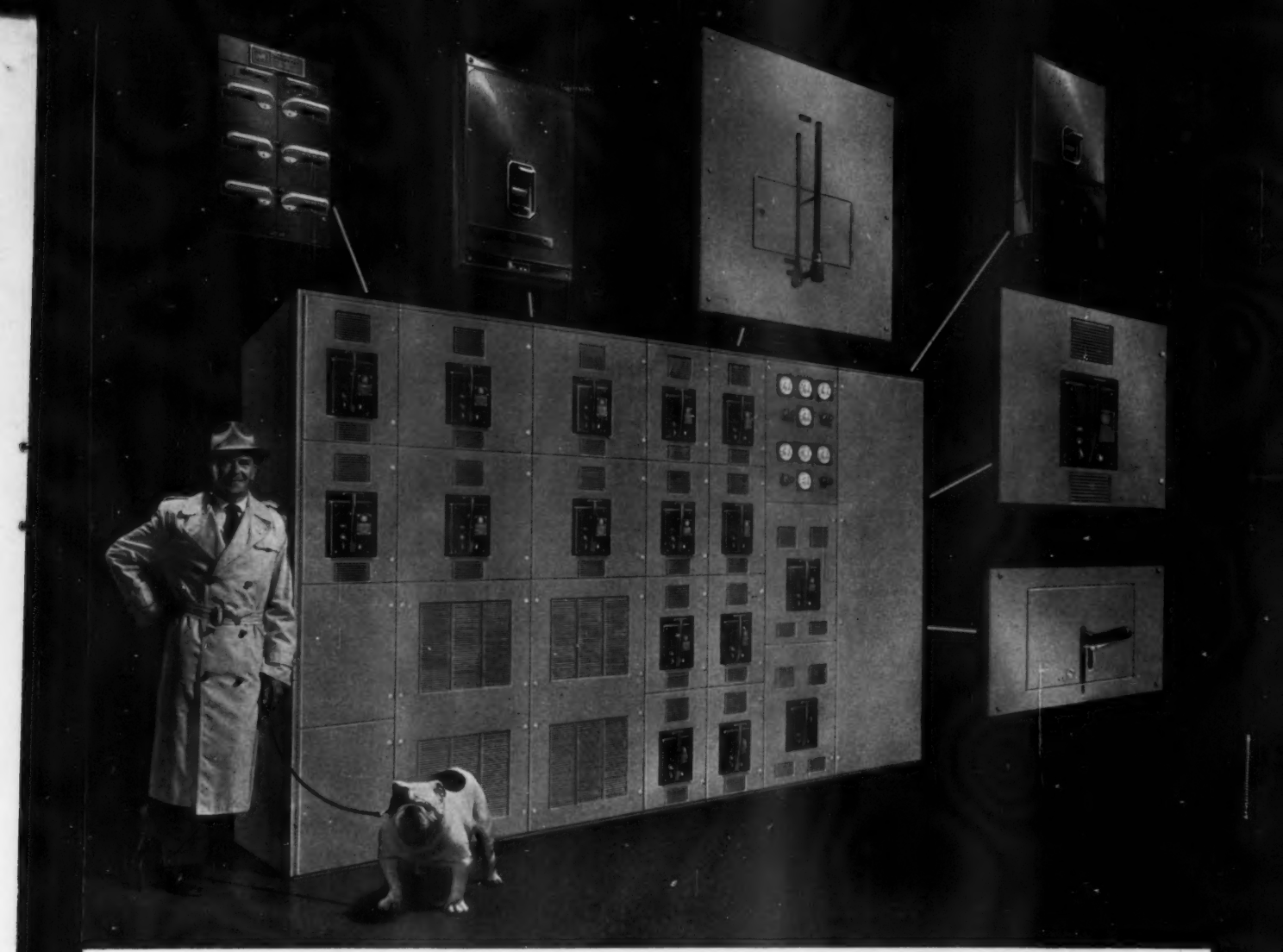
OCCUPYING APPROXIMATELY 7500 sq ft, a plastic-skin building at Stephenville, Texas, is the first building of its kind to be constructed. It was completely built on the ground, being raised as each row of units was assembled and attached to the bottom row of the building "plates." No scaffolds were required for the job.

The plant will be used to manufacture plastic structural parts for the construction industry. It will be in the form of a trussed arch, spanning 78 ft without vertical support.

When completed, the building will be composed of 617 precast, prestressed four-foot Plasta-Shade units produced in the Fort Worth plant of Structural Plastics, Inc., who will occupy the new building.

The plastic units are patented hyperbolic paraboloids of fiberglass-reinforced plastic. They are produced in two basic models—conventional, with two adjacent sides perpendicular, and modern, with no two adjacent sides perpendicular and no sides parallel. Panels are translucent, in clear or colored shades.





ANNOUNCING: THE NEW BULLDOG DF-60

UNCHALLENGED FOR VERSATILITY

BullDog's new DF-60 lets you put everything from large air circuit breakers to small Vacu-Break® units in one space-saving enclosure. It will handle any of the following light-duty or heavy-duty switch units . . . in any combination:

- New I-T-E K-line back-connected air circuit breakers, 225 to 4000 amperes
- I-T-E Molded Case Circuit Breakers, back-connected or panelboard-mounted, 15 to 800 amperes
- I-T-E Cordon* Circuit Breakers, back-connected, 15 to 600 amperes
- Fused Pressure Switches, back-connected, up to 4000 amperes
- BullDog DF-30 fused switches, back-connected, 30 to 1200 amperes
- BullDog Vacu-Break® units in panelboard mounting, 30 to 600 amperes

In addition there is room for current-transformer equipment and metering systems.

A call will bring your local BullDog field engineer to assist you in selecting the type, combination and arrangement of units needed to handle your power load . . . help supervise installation. You'll find the new DF-60 is easy and economical to install, too. Bus duct systems up to 4000 amperes can be connected directly to the board. For complete details send for Switchboard Bulletin SB-555.

*Trademark registered by I-T-E Circuit Breaker Company

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts circle 567 on Reply Card

Five-Building "System" for Missile Maintenance Is Air-Supported

TWELVE CENTRIFUGAL BLOWERS keep the Army's new Pentadome system—a nine-story spherical center structure and four smaller outpost domes—supported in the face of wind gusts over 70 miles per hour.

The Pentadome is made up of five hemispherically shaped air-supported structures which can be erected individually or as a connected unit. The main dome is 150 ft in diameter and 85 ft high—the largest air-supported structure ever built for military use. Each of the four smaller domes is 100 ft in diameter and 50 ft high. The entire structure, with the four outpost buildings, can be erected, ready for occupancy, in two days.

The building system has twelve centrifugal-type blowers, each of which has a maximum discharge of 22,000 cu ft of free air per minute. Electric motors are used, with three gasoline engine generators provided for emergency use.

The blowers, manufactured by Peerless Electric Co., Warren, Ohio, provide a maximum air pressure of approximately 2.5 in. of water column, or about .09 psi, sufficient to stabilize the shelters in 70-mile winds. Under normal conditions, the shape of the structures can be maintained with a pressure of about 0.03 psi.

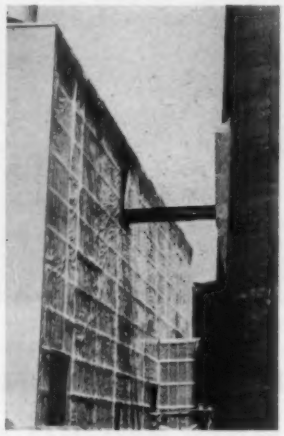
The number of blowers in operation at any one time is selective, depending on wind speed and ventilation needs.

Protection With Polyethylene—Film Keeps Heat in, Mortar Out

DURING construction of the Fort Pitt bridge, Pittsburgh, polyethylene film was used as a barrier to freezing temperatures as freshly-poured concrete went into the curing stage.

Panels of Durethene, a product of Plastics Div., Koppers Co., Inc., were placed on the underside of the roadbed, with tarpaulins on top to complete the bundling of the concrete bridge structure.

Portable ground heaters sent heat through hoses to warm the interior of the "package."

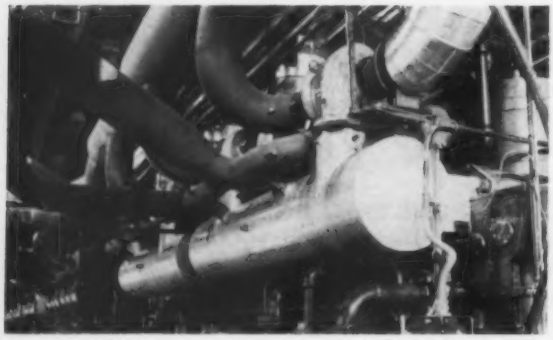


PROTECTING the completed portion of a new plant while its chimney was being erected was accomplished by stretching sheets of polyethylene film, light in weight and easily handled, across the facing wall to keep it clean.

Throughout construction of a 300-ft chimney for a Pennsylvania sewage treatment plant, the adjoining building was protected from falling mortar by a facade of Visqueen film, a product of Visking Co., Division of Union Carbide Corp.

Turbochargers Add Horsepower to Gas Engine Compressor Drives

ADDING THE EQUIVALENT of a new plant generating 9000 horsepower, with no additional space or building required, has been accomplished by the Richfield Oil Corp. at its gas compression facilities near Bakersfield, Cal.



Source of the additional power is the turbocharging of more than 30 Clark gas engine compressor units. Using a method applying AiResearch turbochargers, nearly half the engines in the system have been converted.

Small, high production type turbochargers, made by AiResearch Industrial Div., Garrett Corp., are adding 25 to 35 per cent to the normal power ratings of the engines.

Installations vary—the six-cylinder engines are being fitted with four turbochargers each, the eight-cylinder models with two turbochargers each, and the three-cylinder units with two turbochargers each.

Basically, the turbochargers, powered by the energy of the engine exhaust gas, perform their function by moving an abundance of high density air into the engine cylinders. This accommodates additional fuel, providing reduced specific fuel consumption, as well as increasing the power output of the engines. Multiple-unit mountings on each engine were selected to provide accessibility and ease of handling the turbochargers.

For more facts circle 568 on Reply Card ⟶

Maintenance painting in industrial plants should begin with top-quality paints. Du Pont Paints, for example, represent long-term savings in wear, appearance and satisfaction.

Another thing. The right colors can help to improve morale. Du Pont's scientific system of Color Conditioning puts the power of color to work for you—easing people's minds, helping them to relax, boosting their spirits.

For expert technical help on color selection and types of paints, turn to Du Pont. This service is free. So is the 28-page booklet, "How to Put Color to Work." Write: E . I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. PE-96, Wilmington 98, Delaware.

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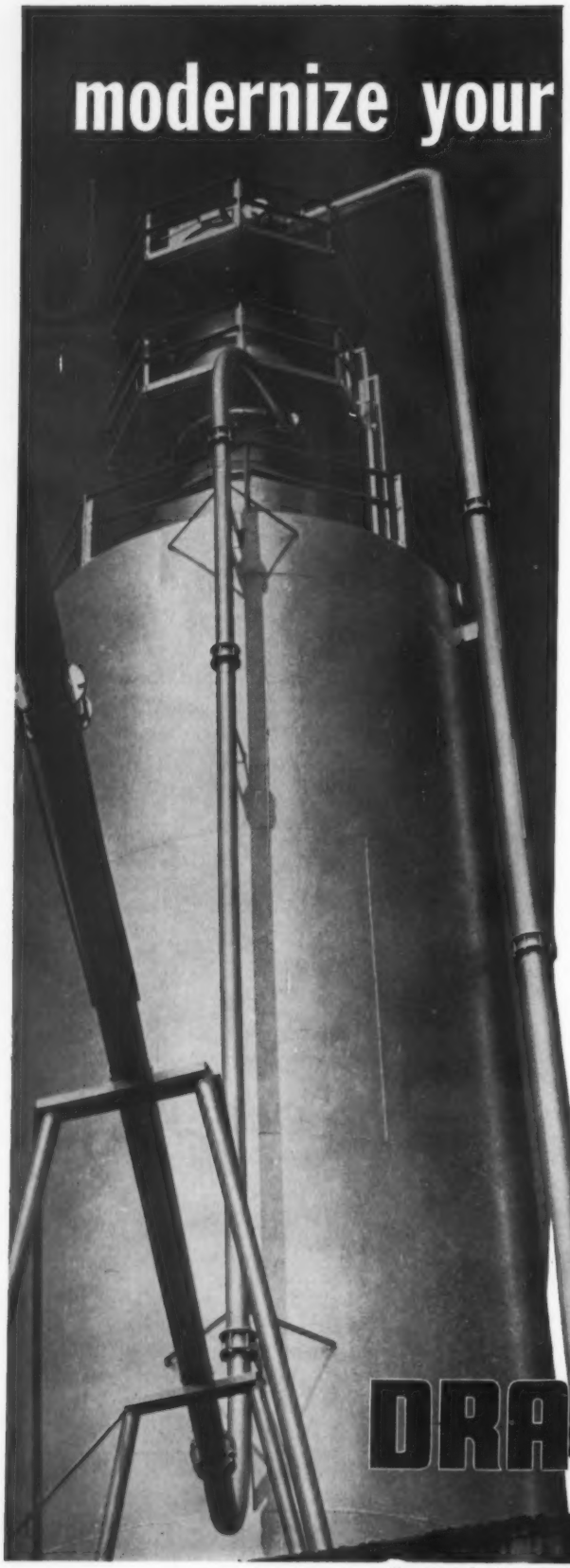

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with Dracco Airstream Conveyors

Modernized bulk materials handling offers the greatest potential for cost reduction and increased productivity. Dracco Airstream Conveyors handle literally hundreds of dry, bulk materials—from coal to corn flakes—and provide these cost-saving benefits:

LOWER LABOR COSTS with automatic operation and one-man supervision . . . no costly manual handling . . . no extra or unnecessary handling steps.

LOWER MATERIAL COSTS through bulk purchasing . . . no loss from spillage or broken bags . . . no spoilage from moisture or contamination.

LOWER MAINTENANCE COSTS through sound engineering, simple design and rugged construction . . . minimum repair and lubrication requirements . . . reliable long-term operation.

UNLIMITED FLEXIBILITY since space-saving systems adapt to new or existing plants . . . conveying lines can be located anywhere . . . no costly auxiliary handling methods needed.

CLEANER PLANTS since Airstream Systems are completely enclosed and dust-free.

GREATER SAFETY with no hazardous moving parts . . . no workmen exposed to toxic materials.

IMPROVED PRODUCT QUALITY from accurate batching and weighing . . . no intermixing of materials . . . no contaminating dusts.

CLOSE INTEGRATION WITH PRODUCTION with centralized, automatic control . . . processes tied into one coordinated operation with no waste motion.

For expert consultation on the modern answer to your bulk handling problem, call in a Dracco engineer today.

DRACCO DIVISION OF FULLER CO.
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DRACCO *airstream* conveyors
dust control equipment
(Pronounced Dray-co)

For more facts circle 569 on Reply Card

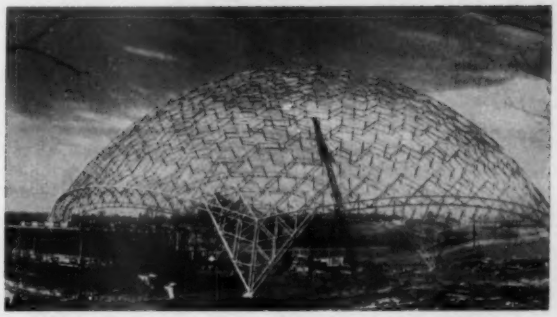
Space Lattice of Geodesic Dome Design Highlights Metals Building

NEW HEADQUARTERS for the American Society for Metals, being constructed near Cleveland, Ohio, have been designed to point out the versatility of metals.

Most prominent is the geodesic dome honeycomb under which the office building is being erected. Of open design, and actually two dome lattices separated from one another by 30 inches of space, the structure will remain uncovered, and will serve only as an architectural design feature. Rising 10 stories in height, with a diameter of 250 ft, the dome is fabricated of aluminum tubing.

The tubing is of two diameters—the base supports, pylons and connecting trusses are of six-inch diameter, while all other components are of four-inch diameter. Total weight of the dome is 166,000 lb. It was erected in sections of hexagons joined on the ground and lifted into position by cranes and a gin pole.

Another feature is the office building itself, which conforms to a 168-deg semicircle with a 240-ft outer face and a 140-ft inner face. A 240-ft sun shield, made of stainless steel, will run along the perimeter of the western

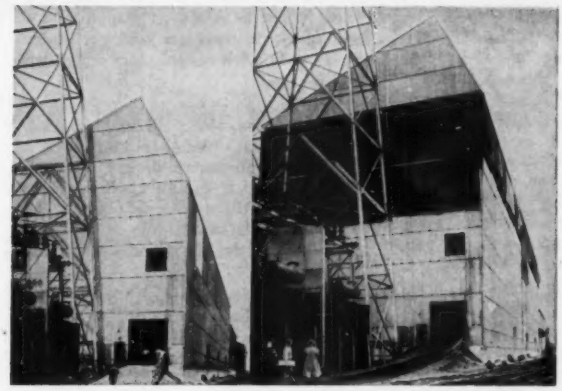


side of the structure, at the third level. Fifteen feet high, the sun shield will be perforated to permit visibility.

Main stairways of the building will be of stainless steel; elevator door and cab interior will be faced with copper; used in other areas of the building will be brass, chrome, nickel, titanium and zirconium.

Building's Too Low, So Roof Is Raised With Hydraulic Jacks

LITERALLY "RAISING THE ROOF", an unusual construction technique is being used in the installation of a continuous annealing line at the Aliquippa Works of J & L Steel Corp.



The new line includes a 75-ft-high vertical annealing furnace; since it is being installed in a building which has a roof only 55 ft high, the roof had to be raised to accommodate the furnace and a crane over it.

Hydraulic jacks, placed at each supporting column around the building, are being used to raise the roof in increments of 12 ft. As each 12-ft increment is reached, new column extensions are added and the side sheeting is put in place to keep the building closed from the weather.

The 28 jacks, each with a six-inch stroke, are elevated simultaneously in two-inch movements at the base of the rams by workers acting on signal. As the roof is raised six inches, the existing columns are bolted to the temporary rams, and the jacks elevated to new positions on scaffolds.

The building is kept in line by steel yokes; one fixed to the bottom of the ram near the jack, the second fastened at the top of the existing building column. The first travels up the face of the column, the second remains stationary while the ram passes through it. Progress is planned at a rate of six feet per eight-hour day.

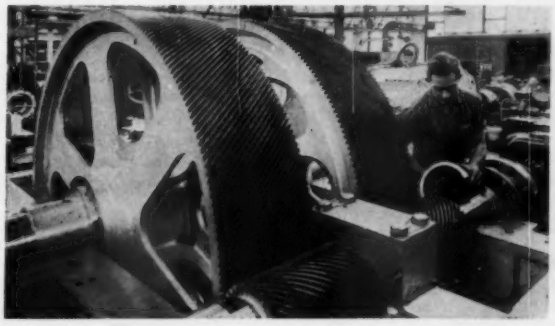
King-Size Speed Increaser Drives Compressor in Gas Line

NOW IN SERVICE driving a 15,000-hp compressor in natural gas pipeline system, the world's largest speed increaser has been built by Westinghouse Electric Corporation's gearing division. The unit is installed at the Egypt, Mississippi compressor station of the Texas Eastern Transmission Corporation, one of 20 stations operating on this company's 30-in. lines from Texas to Pennsylvania.

A large synchronous motor operating at 900 rpm drives the speed increaser, which in turn is coupled to a centrifugal compressor, driving at 6506 rpm. The pumping station consists of the motor-gearing compressor set connected into the pipeline.

High inertial starting torque of the special increaser was reduced to an operating minimum by minimizing the gear diameter and at the same time increasing the gear face width as necessary to transmit the load. However, the wide gear face made it necessary to use a three-bearing pinion shaft to eliminate shaft deflection.

Pressure lubrication to all bearings and gear mesh is provided by a forced-feed lubrication system. A three-section fabricated housing protects the gearing mechanically and provides permanent alignment.



NEW PLANT CONSTRUCTION —advance information on location, costs

Canoga Park, Calif.—North American Aviation, 633 Canoga Ave., plans to construct a new plant. The two-story concrete structure will be 300 ft wide and approximately 420 ft long. Work will get under way as soon as plans are completed and ground is cleared. New facility, reported to cost in excess of $800,000, will be completed in 1960.

El Segundo, Calif.—Filon Plastics Corp., has acquired a nine-acre tract of land on which it proposes to build a million dollar plant for the production of fiberglass translucent building panels. New facility will have a floor area of 70,000 sq ft. Construction will begin soon for completion by 1960.

Englewood, Colo.—Garden Farm, Inc., Sealtest Foods Division of National Dairy Products, E. 60th and Albion Streets, Denver, Colo., plans to construct a two-story, 42,000-sq ft dairy processing plant. Work will be under the supervision of J. R. Fooks, 745 S. Bryant St., Denver, Colo. Plant will cost approximately $1 million.

Springdale, Conn.—Polymer Industries, Inc., subsidiary of Philip Morris Co., Poplar Street, this city, plans major expansion program at company's facilities here. Company plans to spend in excess of $500,000 to double present production facilities. Work will get under way at once for completion by early 1960.

Wilmington, Del.—E. I. du Pont de Nemours & Co., Inc., Nemours Building, plans major expansion of company's Chestnut Run sales development and customer service laboratory. Construction will begin at once and will just about double present laboratory facilities when completed late in 1960. Plant will cost about $1 million.

Tampa, Fla.—Pan American Sulphur Company has announced that construction is under way on a dry bulk and liquid storage facility. Plant will be capable of handling up to 300,000 tons of sulfur, both dry and liquid annually. Plans call for completion of the project by late summer at a reported cost of $500,000.

Bridgeview, Ill.—Ajax Box Division of the St. Regis Paper Co., 75 E. 45th St., New York, N. Y., will start construction on a 165,000-sq ft corrugated box plant to be located here. Plant will be a one-story steel and brick structure, designed for an annual capacity of 35,000 tons of corrugated products. Plant will cost $1.5 million.

Richmond, Ind.—Aluminum Company of America, 1200 Alcoa Building, Pittsburgh, Pa., will begin construction on a major expansion of company's closure plant located here. New addition will cost approximately $1 million when completed in 1960.

Fall River, Mass.—Dixon Chemical & Research, Inc., Bloomfield, N. J., has authorized construction of a bulk sulfuric acid terminal here. New facility will speed delivery of all grades of sulfuric acid to the New England area. Terminal when completed in 1960, will have a storage capacity of 3200 tons and will have blending facilities to make any grade of the product. Complete laboratory facilities will also be available.

Jackson, Miss.—Blaw-Knox Company, 2042 Farmers Bank Building, Pittsburgh, Pa., plans to construct a branch plant for its Power Piping and Sprinkler Division on large building site located here. Company has awarded contracts to the McReed Construction Company and the Mitchell Engineering Co., to begin construction of the new plant for completion in 1960.

Tupelo, Miss.—Pennsylvania Tire Company, wholly owned subsidiary of Mansfield Tire & Rubber Co., Mansfield, O., plans to erect a $15-million tire plant on large site here. Construction will begin in the fall of this year for completion by late 1960 or early 1961. Plant will have an initial tire output of 1500 tires per day which will be expanded to 5000 per day.

Culbertson, Montana—Pacific Vegetable Oil Corp., 62 Townsend St., San Francisco, Calif., plans to construct a safflower oil processing plant on large tract of land recently acquired for the purpose. Construction of the new facility is already under way and is scheduled to be placed in operation by November. Plant will cost approximately $500,000.

Holmdel, N. J.—Bell Telephone Laboratories, Murray Hill, N. J., subsidiary of American Telephone & Telegraph Co., New York, N. Y., plans to construct a research and technical laboratory on site here. Facilities, to cost approximately $20 million, will be completed late in 1961.

New York, N. Y.—Pepsi-Cola Co., 46-02 Long Island City, N. Y., plans to construct a concentrate plant on the North Carolina Seaboard. Plans call for immediate construction with completion scheduled for early 1960.

Asheville, N. C.—Ball Brothers Company, Ryan and Burt Streets, Muncie, Ind., plans to build a new multi-million dollar glass container manufacturing plant on the outskirts of this city. A 120,000-sq ft warehouse will be erected and placed in operation late this summer. This will be followed by construction of a manufacturing building scheduled for operation late this year. New plant will produce a wide variety of bottles and jars for the food, beverage, chemical and pharmaceutical industries.

Winston-Salem, N. C.—Hanes Hosiery Mills Company plans major increase of company's facilities for the production of seamless silk stockings. Plans call for an expenditure of approximately $27.5 million. Company has announced plans for the construction of a new plant, near here, to cost about $12 million including equipment. Structure will be a one-story brick, concrete and steel structure and will be completed by late 1960.

Barberton, O.—Columbia-Southern Chemical Corp., subsidiary of Pittsburgh Plate Glass Co., 1 Gate Way Center, Pittsburgh, Pa., has awarded a contract to the Rust Engineering Co., 930 Fort Duquesne Blvd., Pittsburgh, Pa., in the amount of $7 million for the construction of a cement plant here. Work on the plant will get under way at once with completion scheduled for late 1960.

Glassmere, Pa.—Air Products, Inc., Allentown, Pa., plans to construct a $6-million high-purity liquid oxygen, liquid nitrogen and liquid argon plant on a 22-acre plant site. Work on the plant is already under way and partial operation of the facility is expected late this fall.

Philadelphia, Pa.—Gulf Oil Corp., 2900 Gulf Building, Pittsburgh, Pa., will start construction soon on a multi-million dollar oxo-alcohol petrochemical plant at its local refinery here. Construction will begin this summer and will be completed in 1960.

Steelton, Pa.—The Bethlehem Steel Co., Bethlehem, Pa., plans to construct a mill for rolling steel concrete reinforcing bars at company's local plant here. Construction of the new facility will begin at once and will take about 18 months to complete. When mill is placed in operation early in 1961 it will have a capacity of 350,000 tons per year.

Oak Ridge, Tenn.—Vitro Corporation of America, 261 Madison Ave., New York, N. Y., plans to build a $3.5-million fuels reprocessing pilot plant here, to handle fuels from the newer reactors as well as larger elements from the older types. Plant will be

(Continued on page 260)

FALK All-Motor Motoreducers driving pipe conveyors in seamless tube mill.

Photo courtesy of
The Colorado Fuel and Iron Corporation

You get these "extras" when you buy FALK *all-steel* Motoreducers

1. **Freedom from damaged housings.** The exclusive FALK *all-steel* construction gives full protection from cracked housings or torn-off feet...plus twice the ability of cast iron to maintain vital alignment.
2. **12-15% reserve load-carrying capacity** in the gears, by AGMA standards. The extra-depth, high pressure angle helical gears are another FALK exclusive ...they assure better operation and longer gear life.
3. **Highest known gear efficiency**—98½% per gear train under full load! This means maximum productive work for your power dollar.
4. **Longer service life**...advanced FALK design makes it possible to machine both bores for each shaft assembly at one time, thus eliminating possible accumulation of tolerances that occurs when individually machined parts are assembled. The result—better alignment of revolving elements that permits units to transmit rated capacity longer.
5. **Standard units to fit your needs.** Integral and All-Motor® Motoreducers are available in horizontal, vertical and right angle types...a type for every use.

Units are available up to 75 hp; output speeds from 780 rpm down to 1.2 rpm. Prompt delivery from factory, warehouse or distributor stocks. Ask your FALK Representative or Authorized FALK Distributor for *Bulletin 3100.*

THE FALK CORPORATION, MILWAUKEE 1, WIS.

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

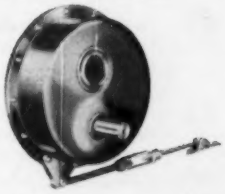
For more facts circle 570 on Reply Card

FALK

...a good name in industry

THE FALK ALL-MOTOR® MOTOREDUCER
the original All-Motor unit

(Shown) Horizontal concentric model. Also available in right angle and vertical types.



THE ALL-STEEL FALK® SHAFT MOUNTED DRIVE

Proved best for the countless industrial applications where a reducing unit mounting directly on shaft of the driven machine is indicated.

Units from 1/2 to 50 hp. Ratios —4:1, 14:1 or 24:1. Torque capacity up to 41,000 lb-in (in standard units). Prompt shipment from stock. For details, ask for *Bulletin 7100.*

For squirrel-cage, wound-rotor, and synchronous motors to 1500 hp

LOW-VOLTAGE INDIVIDUAL STARTERS

1. **Arc chutes** are easily removed for tip inspection, and all components can be quickly replaced if necessary.
2. **Pre-installed protective devices** save valuable installation time. General Electric circuit breakers are simple to reset, and CLF fuses can be quickly replaced.
3. **Completely wired and assembled** starter can be quickly installed. Simply connect incoming power leads and motor-control leads and motor can be put on line.
4. **Air-break contactors** have silver contact tips to give long operating life with a minimum of maintenance.

Write for bulletin GEA-6584 to Section 783-102, General Electric Company, Schenectady, New York.

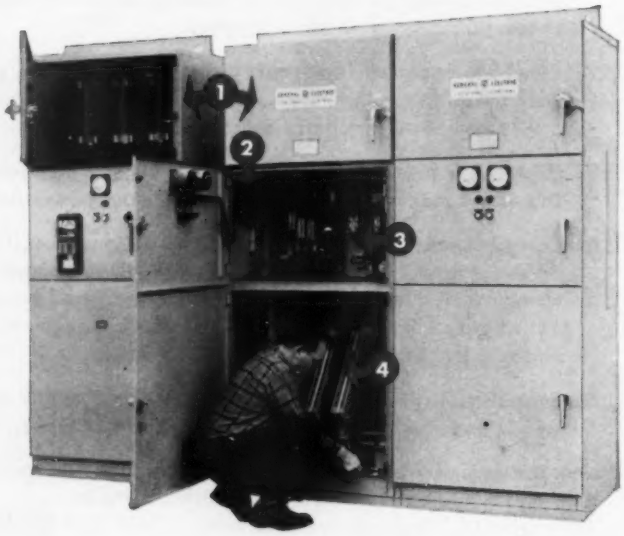
General Electric's complete line of starters is . . .

Faster, less costly to

For individual or grouped control of motors up to 3000 hp

HIGH-VOLTAGE LIMITAMP* STARTERS

** Registered Trade-mark of General Electric Co.*



1. **Individual or grouped control** is obtained by installing 30-inch deep Limitamp starters as units or in lineups, mounted back-to-back or back-to-wall with a common power bus.
2. **Ample space for cable entry** is provided at top and bottom of unit. All installation wiring is made to conveniently located terminal boards.
3. **Hinged low-voltage panel** swings out for accessibility. Front-connected components are easy to maintain.
4. **High-voltage contactor** rolls out of enclosure. Low-voltage connections are plug-in type. Tip changing and a-c coil removal are fast and require a minimum of effort and tools.

For more information contact your G-E Apparatus Sales Office, or write for bulletin GEA-6331 to Sect. 783-102, General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

LOW-VOLTAGE MOTOR CONTROL CENTERS

For flexible, grouped control of motors up to 400 hp

1. **All starter units in one structure** eliminates grouping of individual starter enclosures and associated installation expense.
2. **NEMA Class II construction** has factory-wired and tested interconnections. To install, simply connect power and outgoing motor-control leads.
3. **Front connected units** are accessible for speedy inspection and maintenance of wiring and components.
4. **Easily removable starter units** reduce bench maintenance time. Speed latches expedite unit removal; hold units in place when engaged. Components are readily accessible from top, front, and sides when starter unit is removed.

Write for bulletin GEA-4979 to Section 783-102, General Electric Company, Schenectady, New York.

install and maintain

LOW-VOLTAGE CABINETROL* POWER CENTERS

** Registered Trade-mark of General Electric Co.*

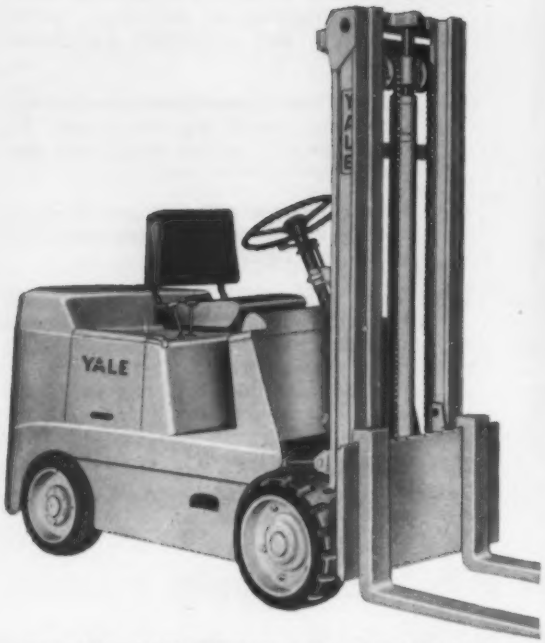
For custom-engineered grouped control of motors up to 900 hp

1. **Roomy starter compartments** facilitate routine inspection and maintenance without removal of starter unit from compartment.
2. **Custom engineered controls** are supplied to specific application needs. Complete system is factory-wired and tested. Installation requires only connecting incoming power and motor-control leads.
3. **Easily accessible components** are mounted with ample room for adjustment and maintenance. Spring-latch door provides easy access.
4. **Hinged, full-height rear doors** allow inspection and testing of continuous process equipment without stopping the process.

For more information contact your G-E Apparatus Sales Office or write for bulletin GEA-3856 to Sect. 783-102, General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

For more facts circle 571 on Reply Card



NEW YALE GASOLINE TRUCK LINE...COMPACT DIMENSIONS, 2-SPEED TRANSMISSION PROVIDE FAST CYCLE OPERATIONS. Gives excellent gradeability and high tractive effort. 80'-per-min. lift with full load—fast stacking action. Compact dimensions for high maneuverability, short turning radii. Widest channel roller spacing plus side thrust rollers resist off-center loading, lessen channel wear. Roller-mounted carriage, designed for all types of attachments, has 4 side thrust rollers. Exclusive trail assembly, mounted on dual articulating pins supported in rubber, provides greater stability, cushioned ride. Gasoline or LP-gas. Capacities: 3,000, 4,000, 5,000 lbs.

NEW YALE LOW SILHOUETTE ELECTRIC TRUCK LINE... PRECISE SPEED CONTROL COMBINED WITH SHORT-TURNING MANEUVERABILITY. Mechanically actuated **carbon pile speed control**—gives smooth starts and acceleration—produces infinite motor speeds! **Easy steering**—dual caster wheels mounted on ball bearings! Short turning radius—good maneuverability! **Low profile**—71" mast height. Available with Triplex Mast. Other features include—hydraulic wheel brakes—removable battery box—H-I single lever control for multiple function attachments. Capacities: 2,000, 3,000 lbs.

NEW LINES OF cut materials handling costs

Other new YALE cost-saving lines

NEW YALE 6,000 LB. CAPACITY ELECTRIC TRUCK—compact! High speed for faster cycle operation.

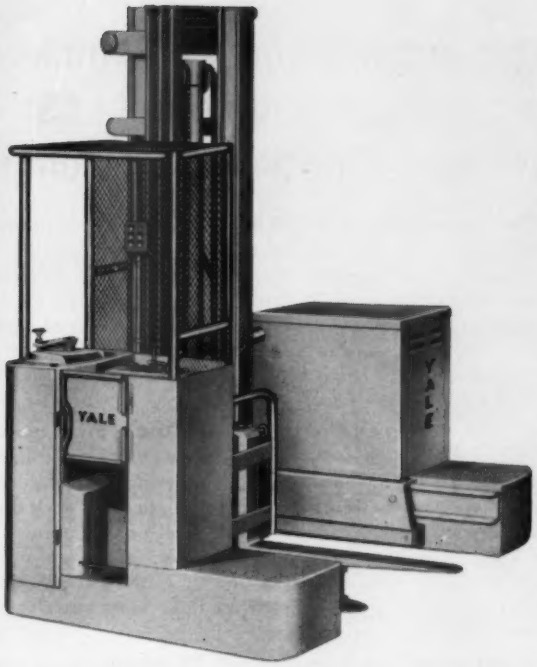
NEW YALE GASOLINE TRACTOR LINE—speeds indoor and outdoor hauling operations. 3,000, 4,000, 5,000 lbs. ultimate drawbar pull capacity.

NEW YALE WORKSAVER TRACTOR—economically speeds warehouse and trailer train order picking. Drawbar pull capacity: 700 lbs.

YALE INDUSTRIAL TRACTOR SHOVEL—does 10 hours' work in an 8-hour shift. Carry capacity: 2,500 lbs.

Yale Materials Handling Division, a Division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark.

NEW YALE END CONTROL ELECTRIC TRUCK LINE SPEEDS OPERATIONS THROUGH RECYCLING SPEED CONTROL. **Automatic recycling speed control**—speeds operations! **Smooth acceleration**—4 speeds forward and reverse with time delay between speeds for smooth acceleration! **Brakes**—mechanical brakes in wheels—step up to apply! Available with Triplex Mast. Steering wheel positioned for operator comfort and safety. Short turning radius! H-I single lever control for multiple function attachments. Capacities: 2,000, 3,000 lbs.



NEW YALE SIDE-LOADER ELECTRIC TRUCK LINE PROVIDES NEW CONCEPTS IN WAREHOUSE HANDLING. Safe, fast handling in narrow aisles, at extreme heights—increases storage space. **Easy, accurate load positioning**—cuts cycle time in rack position by 50 per cent. Handles palletized or long loads—high flexibility of application. 24-volt system—gives **high lifting speed. Wheels** rotate 90°—maneuverability in cross aisles. **Yale Triplex Mast**—rugged, stable, high lift. Capacity: 3,000 lbs.

YALE LIFT TRUCKS to ...increase profits

YALE HEAVY DUTY SERIES G-5 GASOLINE TRUCK—rugged design—compact for fast cycle operation. Capacities 15,000 to 20,000 lbs.

YALE HEAVY DUTY K-410 ELECTRIC TRUCK—heavy industry power—short turning radius. Capacities: 12,000 to 20,000 lbs.

NEW YALE WAREHOUSER with 24-volt system. Straddle or Extend-A-Load models. Capacities: 2,000, 3,000, 4,000 lbs.

YALE®
INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS • HOISTS
YALE & TOWNE

Yale Materials Handling Division, Philadelphia 15, Pa.

Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists

For more facts circle 572 on Reply Card

This propane tank wall shrinks... but free-standing **FOAMGLAS®** solves the insulation problem

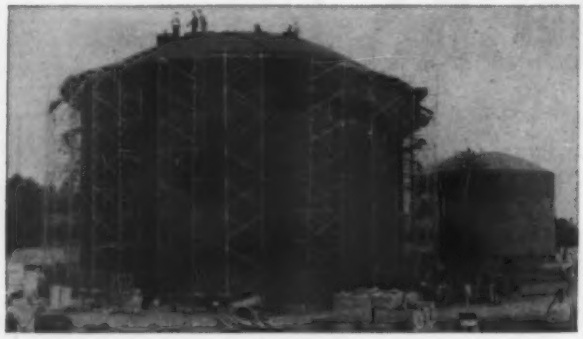
The strength of FOAMGLAS solved an unusual insulation problem posed by contracting tank walls in the nation's first refrigerated propane storage plant. Designed and built by Stone & Webster Engineering Corp., for the Atlanta Gas Light Company, the storage facilities at Riverdale, Georgia, consist of three steel tanks. Each is 70 ft. in diameter and 52 ft. high with a capacity of 1,297,500 gallons of refrigerated propane.

When the tanks are pulled down to an operating temperature of —46°F., their walls contract. Ordinary insulations—applied in direct contact with the tank walls —just won't work. But the unique strength of FOAMGLAS permits its use as a free standing wall of insulation . . . self-supporting and separated from the tank walls by an air space. The same high compressive strength permitted placing FOAMGLAS beneath the tank floors as well as on the tank roofs.

Insulating performance? FOAMGLAS is completely moisture-proof to insure constant high insulating value for the life of the tanks . . . prevent condensation or freezing of moisture between insulation and tank walls. And since FOAMGLAS can't absorb volatile hydrocarbons, it never becomes a fire hazard.

Check the unique combination of benefits offered only by FOAMGLAS. Write Pittsburgh Corning Corporation, Dept. PE-69, One Gateway Center, Pittsburgh 22, Pa. In Canada: 3333 Cavendish Blvd., Montreal, Quebec.

Pittsburgh Corning offers a complete line of mastics, tank coatings and other accessory materials specifically designed for use with FOAMGLAS.



PITTSBURGH PC CORNING

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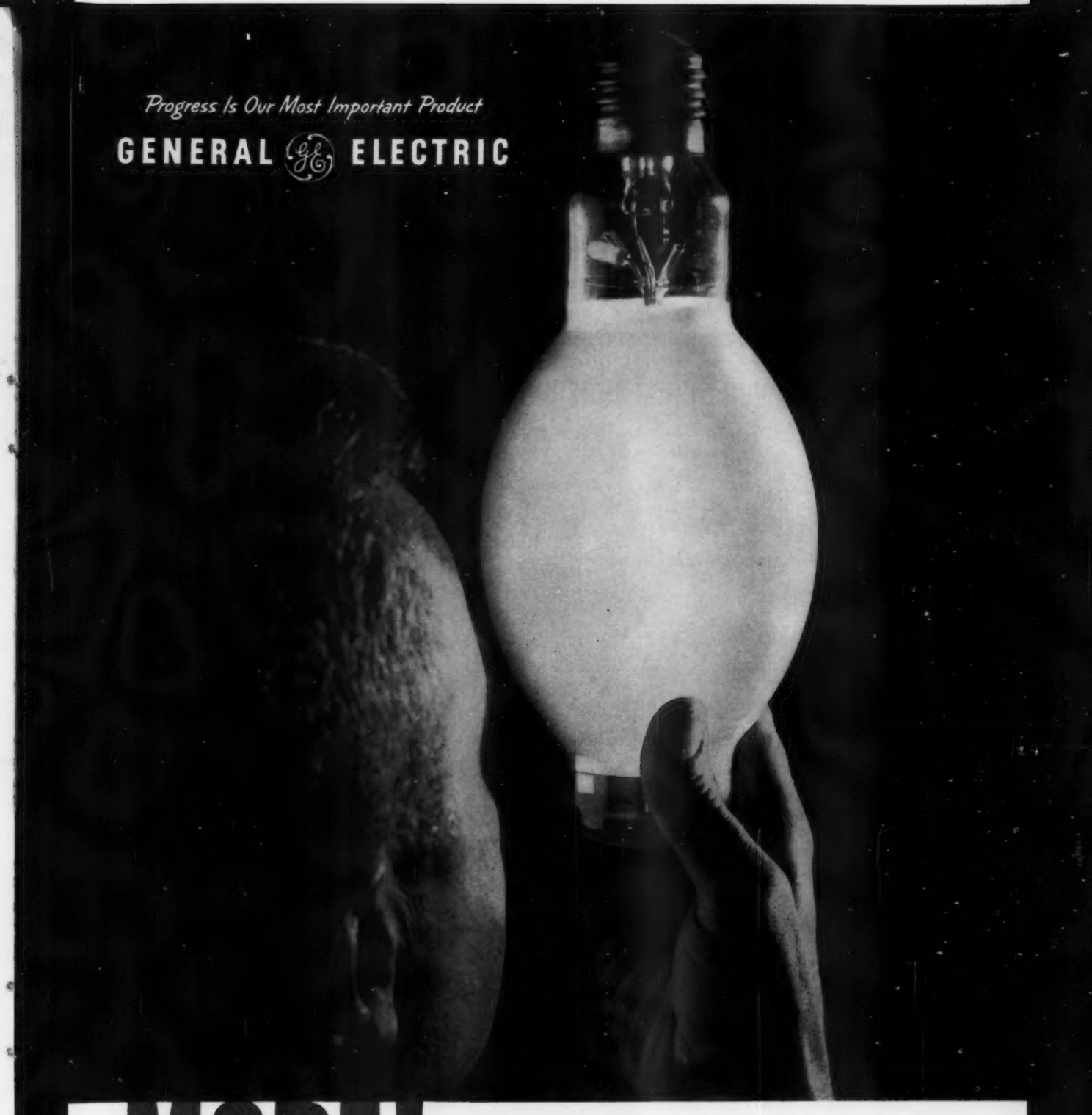
Progress Is Our Most Important Product

GENERAL ELECTRIC



MORE!

"Even in the middle of summer, *everybody's* happy when *this* mercury goes up. It's a General Electric Mercury Lamp . . . and when it goes up in a socket, our lighting level, employee morale and production figures go up, too. But our cost of light drops like a barometer in an approaching storm.

General Electric Mercury Lamps, *at any given time in their life, will outperform other brands the same age.* What's more, they're built to last as long or longer than any other. It figures . . . after all, G. E. is first in mercury . . . just as they are in fluorescent and filament lamps. So, I'll stick with the leader."

General Electric Co., Large Lamp Dept. C-923, Nela Park, Cleveland 12, Ohio

For more facts circle 574 on Reply Card

Here's a steam trap

..and for seven sound reasons:

1. *Simplicity* – only one moving part.
2. *Maintenance* – practically zero. 3. *One trap* for all pressures from 10 to 600 psi.
4. *Uniform performance* – operates equally well on heavy, light, or no condensate load.
5. Operates against *back pressures* up to 50% of inlet pressure. 6. *Rugged* – unaffected by superheat, water hammer, vibration, or corrosive condensate. 7. *Minimizes inventory* of spare parts.

Sarco TD's on outdoor blending tanks of Shell Oil Company, Sewaren, New Jersey, are installed vertically, instead of in the usual horizontal position, in order to drain coils after shut-down, thus preventing freezing.

1. DRAINS AND VENTS

at start-up. Immediately rids lines of condensate and air to permit normal operation. This eliminates the need for manual opening of valves to drain the system.

CONTROL COSTS

In these days of sharp emphasis on cost control, Sarco Thermo-Dynamic TD Traps are helping plants to deliver the full productive power of every pound of steam. And because the TD has no mechanism . . . no gaskets . . . no narrow channels to clog, maintenance cost on the TD is almost nil. As one plant engineer puts it: "This TD is a cinch to install, it's no bigger than a tee fitting, and it works in any position. The TD is the one steam trap we can install and forget."

CHOOSE THE RIGHT TRAP

There's an infinite variety of applications, temperatures, pressures and loads in industrial steam piping. Sarco can help you select the right trap for every job of air and condensate removal, saving you money and down-time.

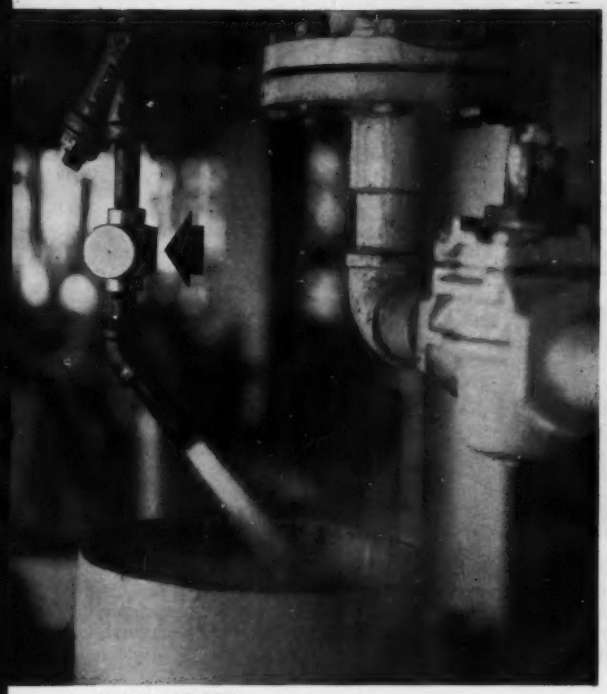
HOW ABOUT THE BUCKET TRAP?

With the development of the patented* Sarco Thermo-Dynamic Steam Trap, the bucket trap suddenly aged 50 years. In a nostalgic way we feel somewhat sorry, because *our* Sarco bucket trap has made us thousands of friends. But frankly, it's no match for the new Sarco TD. Progress is progress.

Some of our customers who are getting satisfactory service from our bucket traps may prefer to replace their old Sarco bucket traps with *new* Sarco bucket traps. If you feel this way, we're flattered enough to keep on making Sarco Bucket Traps – strong, sturdy and durable as ever. Let us suggest, however, that you at least give the new Sarco Thermo-Dynamic Steam Trap a try, under your most exacting conditions.

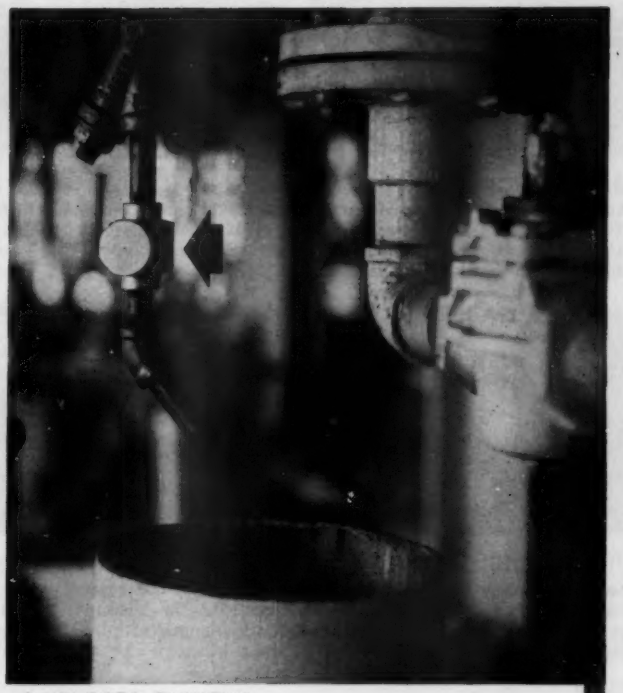
*U.S. Pat. No. 2,817,353 T. M. Reg. U. S. Pat. Off.

that does what a steam trap should



2. DISCHARGES

air and condensate at steam temperature as rapidly as they collect. Does not wait for a bucket of steam to leak through a small orifice.



3. CLOSES TIGHTLY

There is no continuous bleed; nor is there loss of buckets of steam as in the bucket trap which must discharge steam with each cycle.

MAINTENANCE TIME: 40 SECONDS!

How long does it take your maintenance crew to service an ordinary trap? If it's over a couple of minutes, you're throwing away valuable time. The Sarco TD can be cleaned, blown out, if necessary, and reassembled on the line, in as little as 40 seconds. 6345-B

Sarco can give you impartial advice on trap selection because Sarco makes All–5 Types:

Thermo-Dynamic . . . Thermostatic . . . Liquid Expansion . . . Float Thermostatic . . . Camlift Bucket

SARCO COMPANY, INC. 635 Madison Avenue, New York 22, N. Y.

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

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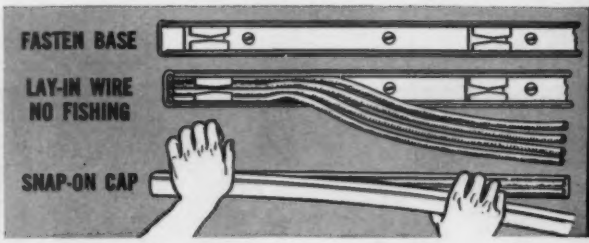
New! Better! Best!

Line-to-load products with exclusive features plus flexibility



SHERARDUCT

Acid bath torture test proves superiority. Double protection: It's Sherardized (exclusive zinc process to galvanize in *depth*)! It's coated inside and out with MVC-1 (exclusive polyvinyl chloride resin that lasts and lasts)!

METAL MOLDING

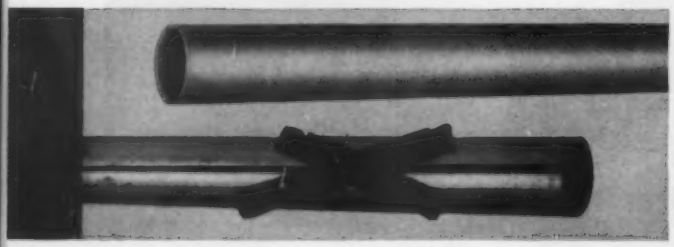
Installation in a jiffy! Only one man to install. To maintain or add wiring, just snap off cover, repair, replace or add conductors —snap on cover. Flat, oval shape. Direct surface mounting. Attractive satin gray.

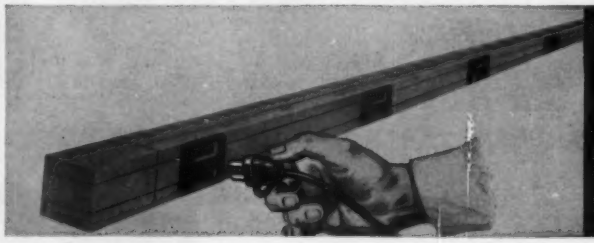
PLUG-IN AND LO-LOSS FEEDER BUSWAY

Lo-Loss busway has closely spaced bus bars for minimum voltage drop. Ratings to 4,000 amperes. Plug-in busway provides easy access to power along entire length of run. Ratings to 1500 amperes.

WROUGHT IRON CONDUIT

For corrosive areas. The only electrically-approved brand. Glass-like fibers in wrought iron create rust-impervious surface. Famous National Electric Sherardized *plus* MVC-1 vinyl coatings. Bends easily and uniformly.





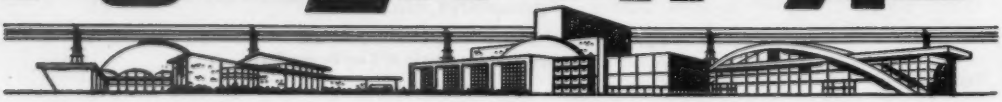
XDUCT JUNIOR

Quality control eliminates splits and high seams. E.M.T. with automated electronically-inspected production. Electrogalvanized outside surface. Aluminum enamel coating inside and out. Easy fishing. Superior bending. Silvery color.

PLUG-IN STRIP

Outlets every 6" or 18". Solid copper electrical system from panel box to last outlet. Lifetime receptacles. No screws, splices or weldpoints to become loose. For kitchens, workshops, offices, stores, laboratories and factories.

POWER AHEAD



from National Electric

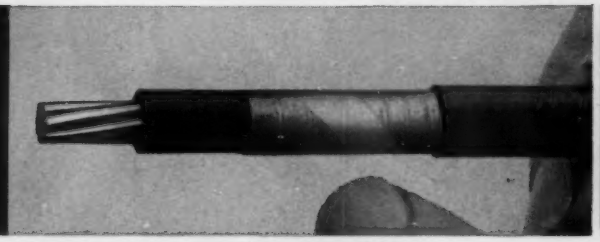
and capacity potential to meet tomorrow's power needs today!

NEW! 15,000 SERIES HEADERDUCT

Largest available capacity. A full 20.294 square inches of wiring area. Provides 100% accessibility to any or all cells in cellular steel floors. Handles largest phone cables. A complete system for cellular floor construction.

BASEDUCT

Saves up to 75% roughing time. Only 3 fittings needed, no screws, no welds. Multi-outlet surface raceway system for new or existing construction. Large, easy-access capacity for future wiring.

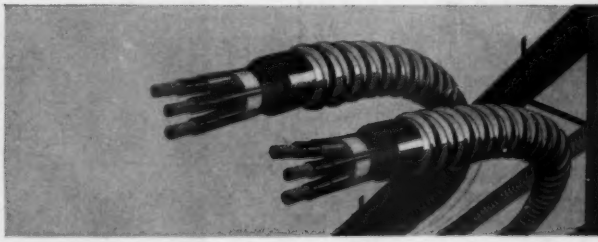


MYLAR* TAPED BUILDING WIRE

Four times the abrasion resistance of rubber-filled tape. Highly resistant to flexing. High dielectric strength. Withstands action of acids, alkalies, moisture, and oxidation. Smaller diameter. *Dupont "Mylar".

TUFFCOTE TELEPHONE WIRE

Three times longer service than bare or low-insulation lines. Eliminates costly tree-trimming and noisy circuits caused by "grounding" in windy, wet weather. Exclusive thermoplastic insulated wire easily spliced to conventional wire.



NEPCODUCT

New junction box is quickly brought into alignment with finished floor even after concrete has set. Leveling adjustment can be made with screwdriver without removing cover plate. Lazy susan interior partition can be relocated in case box should be inadvertently installed in incorrect position.

NEPCO-LOK INTERLOCKED ARMORED CABLE

Outstanding flexibility cuts installation costs. Installed quickly around corners and projections. Economically relocated for changing power needs of the future. 600-5,000 or 15,000 volt . . . one, two, three or four conductor assemblies.

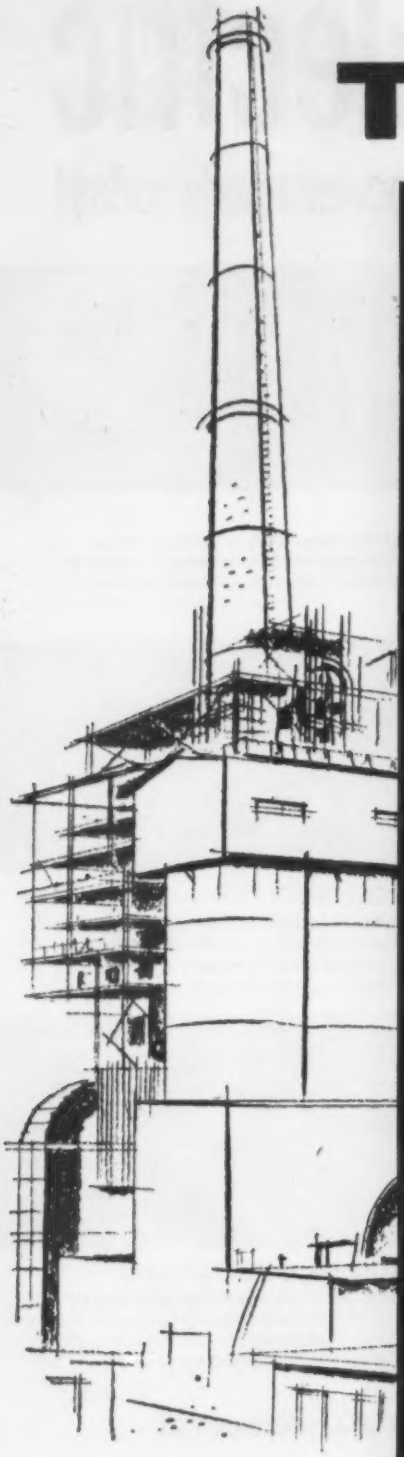
EXPERT APPLICATION ENGINEERING SERVICE AVAILABLE ON ALL PRODUCTS!

NATIONAL ELECTRIC DIVISION **PORTER** ***H.K. PORTER COMPANY, INC.***

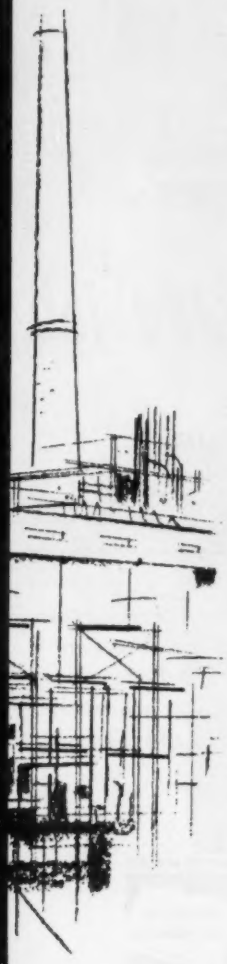
PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

For more facts circle 576 on Reply Card

TWO EASY



WAYS TO REDUCE PLANT MAINTENANCE



Now, more than ever, plant engineers and maintenance men specify Garlock GUARDIAN* Gaskets and LATTICE-BRAID* Asbestos Packings for safe, long lasting prevention of equipment failure due to high pressures and temperatures. Here are their reasons:

GARLOCK GUARDIAN GASKETS

adjust themselves automatically to maintain positive seal when pressures and temperatures change. No need to retighten bolts periodically. They are constructed of spiral wound strips of V-shaped steel, alternated with layers of asbestos . . . this enables GUARDIAN Gaskets to "spring" back to shape after compression. Also permits using lower bolt loads. Use them on boiler manholes, handholes, tube plates, and pipe flanges, where pressures rise as high as 2500 psi, temperatures to 1050° F. Available in round, oval, square, oblong, diamond, and pear shapes; practically any size and in thicknesses 1/8", .175", and 1/4". Write for Catalog AD-104.

GARLOCK LATTICE-BRAID ASBESTOS PACKINGS

require less gland pressure than conventional packings; accordingly, they require adjustment less often. Moreover, LATTICE BRAID outwears all conventional packings thus reducing downtime for repacking. Why? Because LATTICE-BRAID is made of a through-and-through braided construction; each strand passes diagonally through the packing body at a 45° angle, resulting in a unified structure of greater strength. The strands hold together even when the packing is worn far beyond the limits of ordinary braided packings. Next time, repack reciprocating rods or pump shafts with LATTICE-BRAID. See for yourself why so many others use LATTICE-BRAID asbestos packing against steam, oils, gases to 700° F. Write for Catalog AD-131.

Both these products are part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line . . . that's why you get unbiased recommendations from your local Garlock representative. Call him for further information.

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

*Garlock Trade Mark

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

CANADIAN DIVISION:
The Garlock Packing Company of Canada, Ltd.

PLASTICS DIVISION:
United States Gasket Company

For more facts circle 577 on Reply Card

direct drive

...makes fume removal an inside job

Installed directly in ductwork, space-saving DeBothezat Bifurcator Fans provide efficient direct drive power for fume removal.

Damaging fumes are kept away from the motor by a housing of acid-resistant metal alloy or of steel protectively coated with PVC (plasticized polyvinyl chloride) and many other types of synthetic linings. Fan wheels in a complete size range can also be made with similar anti-corrosion protection.

Save Installation Dollars

Installing a DeBothezat Bifurcator Fan is about as quick and simple as putting in a section of ductwork. Direct drive eliminates recurring maintenance problems. From space-saving installation to long-term operating economy, DeBothezat Bifurcator Fans keep costs down all the way. Contact a DeBothezat representative for further details or see our section in Sweet's Plant Engineering File.

De Bothezat™ FANS

A DIVISION OF

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

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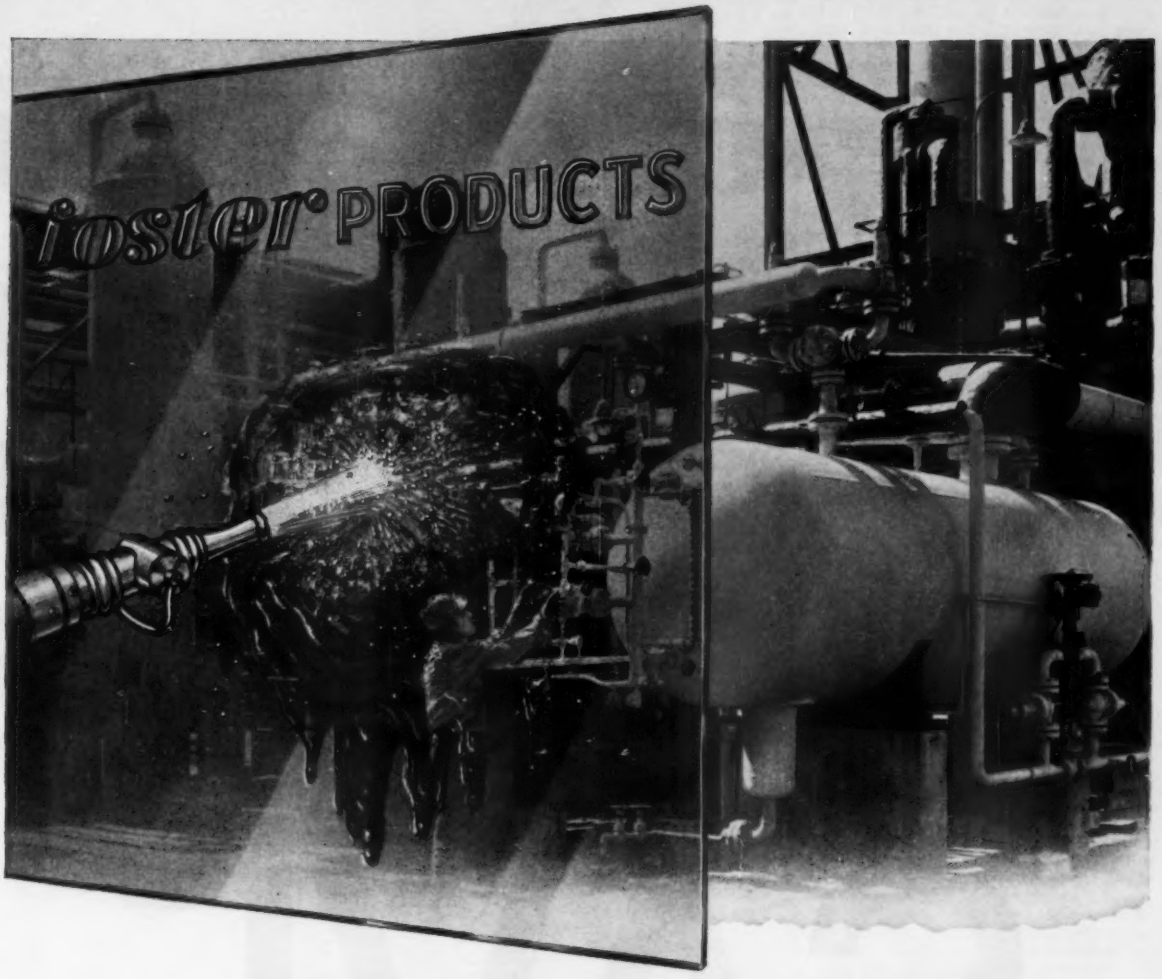
PROTECT *thermal insulation*



RESISTS WATER, FIRE and CHEMICALS

There's a specialized Foster system of rugged coatings, sealers, and adhesives developed to meet your toughest problem of thermal-insulation protection. Insure your insulation investment throughout your plant—see your Foster Sales Engineer, or outline your conditions in a card or letter.

INSULATION & PROTECTION

IT TAKES BOTH TO DO THE JOB

SOLD BY AMERICA'S LEADING INSULATION DISTRIBUTORS AND CONTRACTORS

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BENJAMIN foster CO.
Division of Amchem Products, Inc.

4635 W. GIRARD AVE. • PHILA. 31, PA.

standard products for thermal insulation protection

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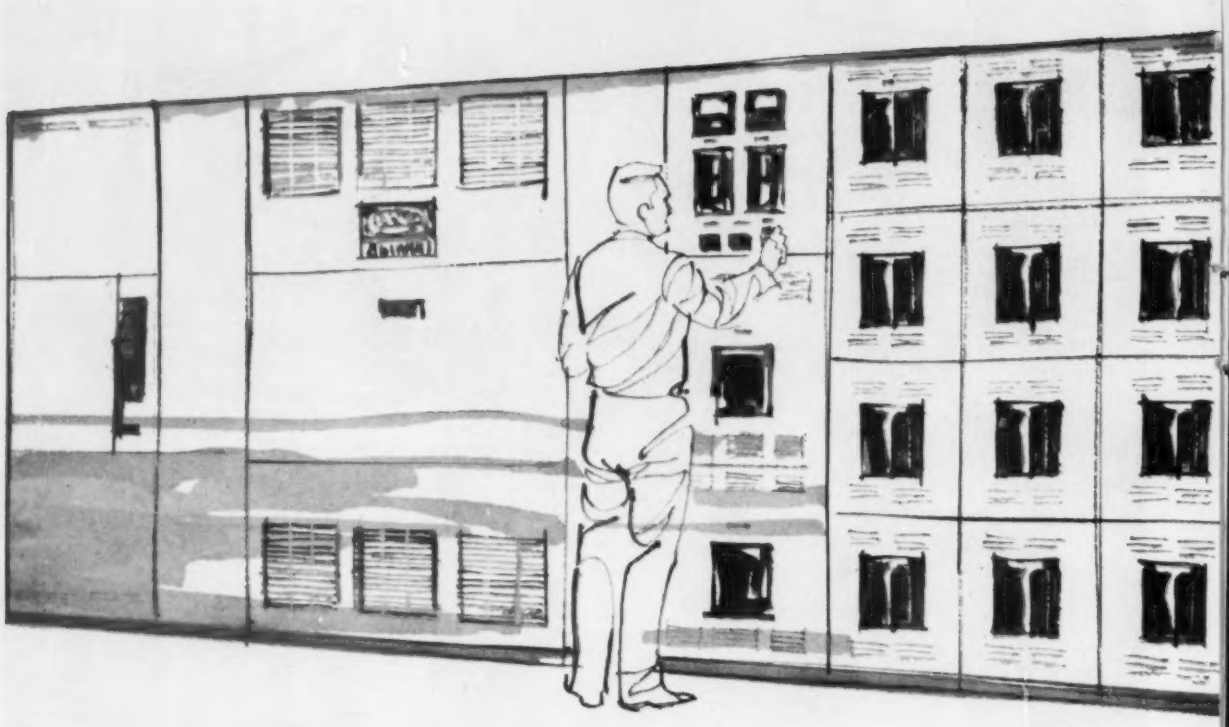


SAVE

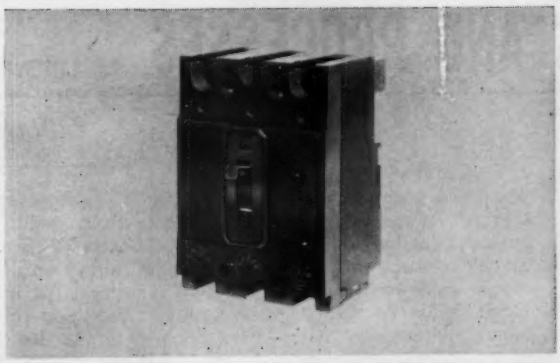
Buy your power at lower cost. Bring it right to your large load areas at economical higher voltage. Save on the cost of your cable conductors. Then get the extra secondary unit substation advantages only I-T-E offers.

I-T-E saves you time. Because only I-T-E designs, fabricates and assembles complete unit substations in one plant. They are shipped all at one time and on one date, timed to mesh with your own construction schedule. So you save valuable construction time.

I-T-E saves you the risk of operating trouble. Transformer engineers and switchgear engineers coordinate their efforts to insure harmony of design. They work with manufacturing people to insure proper construction. They supervise final tests to insure proper performance.

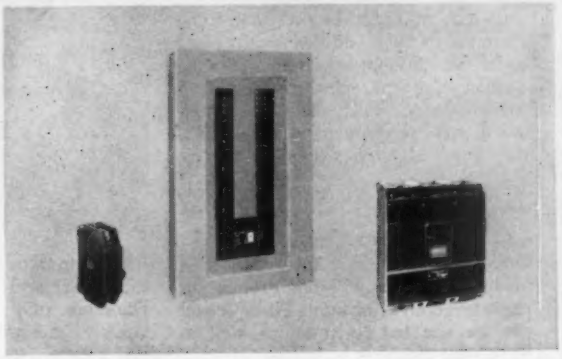
I-T-E saves you installation costs. I-T-E substations are completely assembled on the I-T-E floor before shipped. This insures that all holes line up. Hardware is provided. So when equipment reaches your plant, you are better protected against costly installation delays.

Forethought such as this goes into the design and manufacture of all I-T-E electrical equipment . . . the better to serve you. Good to remember when you get ready to buy.



New 100 amp Type ETI, EH frame, breaker. Here is a new addition to I-T-E's broad line of molded case circuit breakers. It brings economy and space saving for motor control center applications. Available in 2 and 3-pole construction. Type ETI, EH frame, breakers provide the ultimate in motor protection when used in conjunction with a motor-protective relay. The relay protects against overloads. The circuit breaker features pinpointed short circuit trip adjustment with external control previously available only on larger molded case breakers.

Space-saving d-c circuit breakers. A fault on most d-c lines involving large currents could really produce some spectacular results. But I-T-E Model FB d-c circuit breakers interrupt fault currents before they get into the danger area. Opening occurs in roughly 12 milliseconds. Rise rates of even 15 million amp per second are stopped sharp at 60,000 amp. This means extra protection for all associated equipment from damage that even momentary persistence of such high currents could produce. FB circuit breakers are available in either single or double pole. Only 10½ in. wide. Save space. Easy to install.



Preferred by equipment assemblers. Leading independent manufacturers recognize the superiority of I-T-E molded case breakers. And they buy I-T-E most of all. Experience consistently proves that I-T-E's better construction means more dependable performance. Ratings range from 15 to 800 amp continuous . . . the broadest scope of sizes and types in the field. Premium pole spacing eases installation and adds extra safety. Enclosed front-connected pressure terminals accept conductor sizes commensurate with breaker ampere ratings. Convenient externally adjustable instantaneous trip permits easy, fast setting commensurate with short circuit requirements.

I-T-E Circuit Breaker Company I-3
1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Secondary unit substations
- ☐ Power switching centers
- ☐ Molded case circuit breakers
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ D-c circuit breakers
- ☐ TRANFO-UNITS
- ☐ TELEMAND* motor-operated molded case circuit breakers
- ☐ K-LINE circuit breakers
- ☐ Other_____

Name_____ Title_____
Company_____
Street_____
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Get complete, up-to-date information on I-T-E equipment

I-T-E CIRCUIT BREAKER COMPANY

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Gasoline Plant Cuts Valve Maintenance Costs

NEW PRODUCTS AND PROCESSES summarized for your convenience

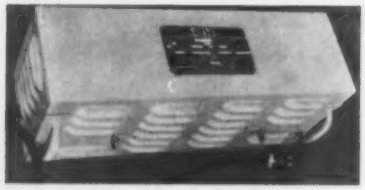
Edited by M. E. Heniken

1—FLOORING resists chemical, mechanical damage

Superior resistance to chemical attack and mechanical abuse are claimed for Emeri-Epox, a fast setting flooring material. It is suggested for topping or resurfacing concrete, wood, tile, stone, brick and metal floors; also for setting tile. Manufacturer says it resists water, steam, oil, grease, caustics, sugars and syrups and most acids. It combines a tough, non-absorbent emery and an epoxy resin. Reported extremely resistant to abrasion and mechanical shock, the material is applied in thicknesses from 1/16 to 1/4 in. and can be feathered to a thin edge. Emeri-Epox is flexible but won't shrink, it is noted, and it won't freeze. Its abrasive surface protects against slipping. The material is supplied as two components—the dry mix of emery aggregate and epoxy resin, and a liquid catalyst. These are intermixed just prior to application. Emeri-Epox comes in gray, red and green. Walter Maguire Co., Inc.

2—CHARGER keeps batteries at peak capacity

Exide Power Mount, an automatic charger for industrial truck batteries, is a silicon-rectifier device with transistorized control unit. It rides around on the battery itself and needs only to be plugged into a 115-v, a-c wall



outlet for on-the-spot charging. This charger, according to manufacturer, is the first to provide a fully automatic, taper-rate charging system in rectifier type equipment; it keeps batteries performing at peak capability, prolongs battery life and minimizes maintenance.

Transistors of the charger's "brain" control a magnetic amplifier, an electrical valve which serves to vary charging current as needed and taper off the charge at the proper rate. To do this, the brain interprets feeds to the amplifier information on battery voltage, charging current and input voltage variations. The charger tapers the input into the battery as the battery becomes more fully charged. When this occurs (16 hr or less) the charger's brain unit signals for an output reduction to a safe, low finish-charge rate which maintains full charge until the truck is to be used. Exide Industrial Div., The Electric Storage Battery Co.

3—WEED KILLER cleans up cooling water ponds

Kuron is reported effective in controlling a variety of aquatic weeds such as water milfoil, fanwort, bladderwort and waterweed which can infest cooling ponds and reduce circulation. Spray concentrations of Kuron involve no hazard to personnel and are not corrosive to machinery, it is stated. The chemical is claimed effective at rates as low as 2 ppm, leaving a margin of safety to fish and to wild animals drinking the water. Company recommends an application of 5 qt of Kuron for each acre foot of water in the pond. The chemical is first diluted with pond water in the spray tank and then applied over the pond surface as a coarse spray. Early summer treatments are recommended by manufacturer. The Dow Chemical Co.

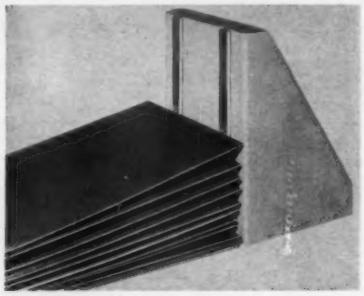
4—PACKAGED FEEDER installs in two steps

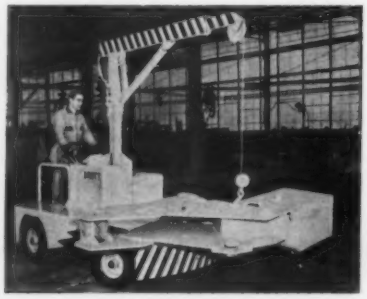
Designed to facilitate introduction of material into any kind of an air pressure conveying unit, this feeder can be adapted to small as well as large operations. It is designed to handle any material which can be conveyed pneumatically, and will feed from bin, hopper or conveyor. After uncrating, feeder is simply put into position and single air connection made. It can be hung from hopper or supported on its own base or stand, and is available in ½, ¾ and 1 hp units. Fuller Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 263-264. Use them for information on advertised products, also. Just circle the key number appearing at bottom of the ad.

5—SHEET FANNER protects hands, saves time

This more powerful permanent magnet fanner makes sheet steel handling both faster and safer, according to manufacturer. The unit employs an oriented ceramic magnet material, Indox V. When steel sheets are stacked against the fanner, a magnetic field is induced in the sheets themselves, making them tend to repel each other and fan out automaitcally. Handlers may remove single sheets quickly and with less danger of injury, it is stated. Because of the unique flux pattern of the Indox V magnet, company engineers claim more positive separation of sheets under difficult conditions—as with dirty, oily sheets that tend to be sticky. The fanner comes in three sizes which meet requirements of sheet stock. Information is in Bulletin 3041. Stearns Magnetic Products.





6—TRACTOR CRANE can handle odd sized pieces

Model 20RM2 Go-Devil is a 2000-lb capacity tractor crane for in-plant and yard handling of odd sized or shaped pieces of material. A feature of this unit is the versatility of the Rotelift boom. Under fingertip hydraulic control the operator can rotate the boom 360 deg continuously, raise it from horizontal to 75 deg, extend or retract it. Dual acting controls permit

Gasoline Plant Cuts Valve Maintenance Costs

Crane Valves Do the Job After Others Fail

Six years ago this large gasoline plant in the Southwest, installed new gate and swing-check valves on hot water pump lines handling boiler make-up water.

Bonnet joint leaks and seat leakage developed after a short time. Maintenance costs jumped. After many attempts to stop the leakage, the bonnet joints were welded shut.

Two years ago the valves finally had to be replaced. Six-inch, 150-pound Crane steel gate and swing-check valves were installed.

Today these Crane valves continue to operate without any leakage at bonnets or seats, and without a penny spent for maintenance.

Why are the Crane valves still operating *with* 100% efficiency and *without* maintenance? *It's Crane quality*—in design, materials and workmanship—that makes the difference!

For information about Crane steel valves for all services—power and process fluids handling—see your Crane Representative, or write to the address below.

IDEAS FOR YOU—This free book gives you 32 case histories of important savings with quality valves. Ask for "Valve Performance Facts."

CRANE® VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Illinois—Branches and Wholesalers Serving All Areas

For more facts circle 581 on Reply Card

NEW PRODUCTS

(Begins on page 178)

these operations to be done simultaneously. The crane has an overall length of 102 in., is 54 in. wide, has a 54-by-54 in. platform. In addition, platform space is available on one side to permit handling of pipe or longer objects. The boom extends 8 ft 6 in. Drott Mfg. Corp.

7—PIPING CONNECTORS, all purpose, flexible rubber

Series R Flex-Hose is for use in controlling water line noises, eliminating equipment vibration, reducing water hammer, simplifying alignment problems and minimizing strain on piping. Manufacturer announces that the lightweight, flexible rubber pipe sections have an acoustical impedance of steel pipe, and will attenuate up to 90 per cent of vibration and noise, depending upon hose length. By inserting the connector between the disturbing source and pipe line, transmission of vibration and noise is reduced. Flex-Hose isolates pipe lines from vibration of compressors, condensing units, water chillers, cooling towers, air handling units.

Series R Flex-Hose is constructed of a rubber liner, several layers of multiple-ply rubber and fabric, wire reinforcing, another layer of rubber and fabric and outer warp. Inner and outer rubber tubes resist chemical action and abrasion and are designed to withstand temperatures to 250 F, pressures to 250 psi. It is available with intergral flanges or iron pipe thread brass fittted couplings, and in a variety of pipe sizes and lengths. The Korfund Co., Inc.

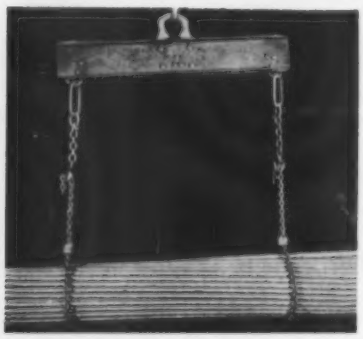
9—THROW-AWAY PALLET weighs little, costs little

So inexpensive it can be discarded after use, the Sak-Pak is made of corrugated paper and wood veneer. This expendable pallet comes in three sizes, the largest costing around 87 cents. Assembly procedure consists of folding over two opposite ends to form channels for the forks of a lift truck. Channels are reinforced with ⅛-in. Kraft veneer board.

Sak-Paks were developed by a cement company for handling and shipping sacks of cement. In this application, their use is reported to have resulted in worthwhile reductions in shipping costs, sack breakage and storage space required for the pallets themselves. The size designed to carry cement measures 36-by-40 in. assembled, and carries a 48-by-40 in. final load. It can hold as many as 36 sacks of cement weighing 3384 lb. The Sak-Pak is suggested for use with other sacked and bagged goods, particularly in chemical and food manufacturing fields. Calco Supply Co.

10—PATCHING MATERIAL heats itself for sealing

Developed for the manufacturer by Armour Research Foundation, this exothermic patching material generates its own heat to seal holes and cavities appearing in the linings of heavy steel-melting furnaces. It is claimed to effect a strong permanent patch—structurally and chemically indistinguishable from the lining itself—in less than an hour. This reduces by 80 per cent the time required by many techniques now in use for this purpose which require fusing of the patch at a temperature high enough to damage the furnace lining, it is pointed out. Carb-Rite Corp.

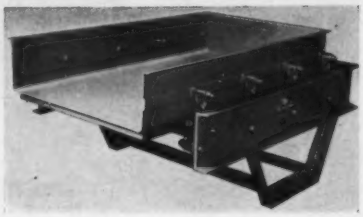


8—CHAIN ASSEMBLY simplifies bundling operations

Having an automatic locking device, with one end of the chain permanently fastened to this lock, ACCO Bundling Chain eliminates pear-shaped links and the need for pins and wire to bind and hold bundles. The assembly is furnished with low carbon, high test, or alloy chain—depending on service and weight of load to be bundled. In locking, the free end of the assembly is put through the housing and a grab hook on the dropper chain pulls the chain tightly around the bundle. The hook's latch automatically falls in between the links, locking the bundle. In unlocking, the chain is again engaged by the grab hook and lifted, allowing enough slack for the latch to be flipped over. When the bundle is set down, the chain is run through the housing, releasing the load. Two sizes cover use with chain from 5/16 to 5/8 in. American Chain Div., American Chain & Cable Co., Inc.

11—VIBRATING FEEDERS simplify bulk handling

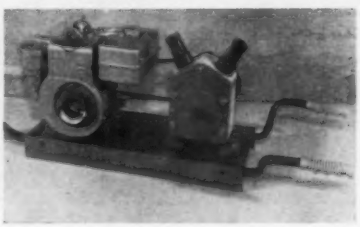
Made in standards ranging from 3- to 10-ft lengths and widths from 6 to 36 in., these vibrating feeders are designed to simplify handling of short carries of bulk materials such as sand,



chemicals, and work in process in limited space between machines or operations. Features include enclosed drive unit, elimination of lubrication problems through use of specially designed rubber bushed, spring loaded supporting arms. Specification Guide 66 gives information. Ajax Flexible Coupling Co., Inc.

12—PLASTIC PUMP can be carried to the job

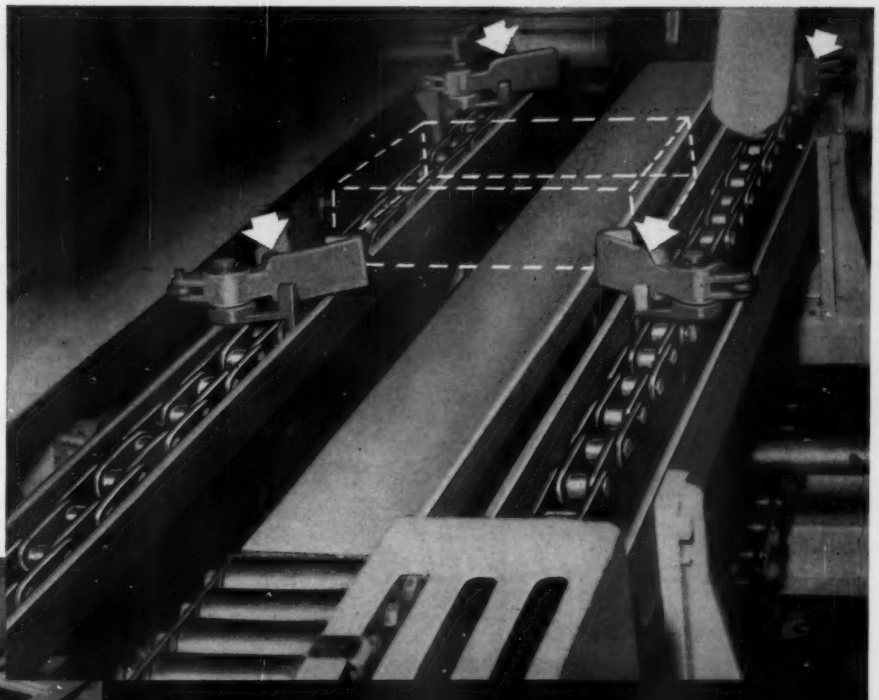
Tote-A-Pump is a plastic sealless pump designed to pump corrosive and abrasive materials in locations where it normally be difficult to arrange a pumping system. Model XB-



120 Tote-A-Pump, pictured, has a capacity of 20 gpm, weighs 65 lb. The power plant is a 2.3 hp air cooled gasoline engine which operates the pump at 1200 rpm. Tote-A-Pumps range from 1/10 to 40 gpm and can be provided with belt guards and recoil engine starters. Vanton Pump & Equipment Corp.

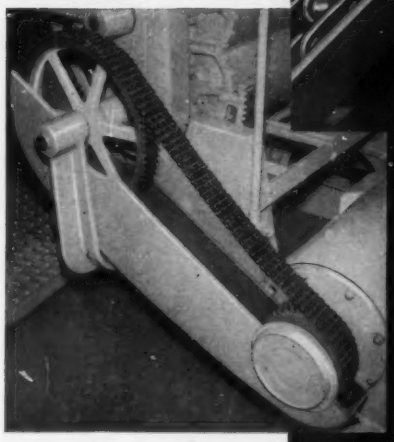
13—PAINT SPRAY HOSE costs less, takes punishment

Synflex Universal Spray Hose is announced as a flexible nylon formulation, unaffected by solvents, paints or thinners, corrosion or industrial atmospheres. There is no dimensional change through action of heat or solvents, manufacturer claims, and besides costing less, this hose offers several advantages over conventional rubber or rubber-composition hose. These include extremely light weight; chemical inertness, permitting use with paints, lacquers, acrylic lacquers,



Parallel strands of DIAMOND Roller Chain are equipped with standard attachments adapted for pushing Cēpacol cartons through primary sealing process.

DIAMOND multiple strand, power transmission roller chain operates over 32 and 76-tooth DIAMOND Sprockets on one of Merrell's Z-bar blenders. The 32-tooth sprocket turns at 125 rpm.



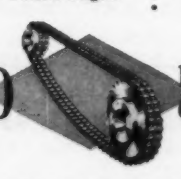
Cost-cutting **Cēpacol** production lines depend on DIAMOND roller chains

● Automated packaging operations help The Wm. S. Merrell Company reduce the manufacturing cost of its well known Cēpacol oral antibacterial products. For power transmission and for synchronized conveyor movements Merrell used DIAMOND Roller Chain. For Cēpacol, as for many other industries and products, DIAMOND durability, accuracy and dimensional stability—its long, maintenance-free service life—contribute substantially to the efficiency and *lower unit cost* of production.

Let DIAMOND Roller Chain prove its capabilities to *you*—in modern packaging operations or wherever *the efficient transfer of power or motion* is a problem. Write for DIAMOND's new descriptive catalogs and engineering data.

For name of your nearest Distributor, look under "Chains" or "Chains, Roller" in your Telephone Directory Yellow Pages.

DIAMOND CHAIN COMPANY, Inc.
A Subsidiary of American Steel Foundries
Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana
Offices and Distributors in All Principal Cities

DIAMOND  **ROLLER CHAINS**

For more facts circle 582 on Reply Card

This Pole-Type Warehouse cost only 2^{00} a sq. ft.

Chapman Chemical Company, Memphis, Tenn. erected this 100 ft. by 210 ft. warehouse for only $2.00 a square foot including retaining wall, floor and sprinkler system. It has plastic skylights, 4 overhead doors in front, one in back plus the usual pedestrian entrances. Aluminum Products Company, Zelienople, Pa. is the Koppers Qualified Contractor who built it.

Because it is constructed on Koppers pressure-treated poles, it will last for generations with practically no maintenance. If you are planning to build, investigate Koppers pole-type construction, the economical way to build a sturdy, permanent structure—fast.

For complete information fill out and mail the coupon today.

Wood Preserving Division C-28
Koppers Company, Inc.
786 Koppers Building, Pittsburgh 19, Pa.

Please have a Koppers Qualified Contractor call on me.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

KOPPERS **POLE-TYPE BUILDINGS**

For more facts circle 583 on Reply Card

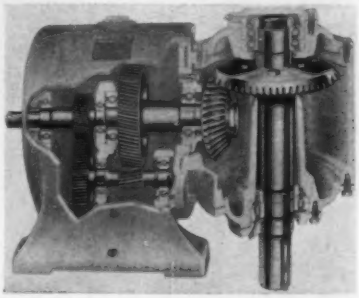
NEW PRODUCTS

(Begins on page 178)

enamels, plastisols and varnishes; high internal abrasion resistance, permitting use with porcelain finishes; high resistance to kinking or external abrasion. Synflex Universal Spray Hose is a translucent white in color with maximum operating temperature above 150 F. It comes in five sizes from ⅛ to ⅜ in. ID. Synflex Products Div., Samuel Moore & Co.

14—RIGHT ANGLE HEAD for speed reducers

Adaptable for use on company's StraitLine series of speed reducers and gearmotors, this universal-mounted right angle attachment can be furnished in horizontal, vertical or intermediate positions with single or double extended shafts. It features spiral



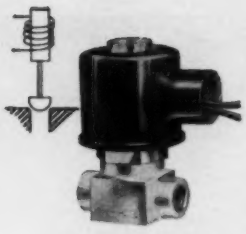
bevel gearing cut from alloy steel forgings and case hardened. Conservatively selected bearings, husky output shaft and a wide bearing span provide ample overhung load capacity for chain, pinion and belt service, it is noted. Other features announced include dry-well construction to prevent oil leakage down the output shaft in vertical mounting; a simple splash lubrication system, integral with the main housing; and low maintenance. Western Gear Corp.

15—ULTRASONIC CLEANER rolls from job to job

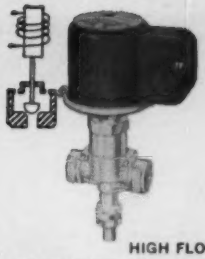
Mounted on rubber-tired wheels, this ultrasonic cleaning system can be pushed from location to another for use wherever electric power is available. Manufactured to order, this mobile system is suggested for cleaning power demand meters, tools, insulators and parts. Cleaning time for most items is less than 1 min, company says. Cleaning tanks up to 75-gal capacity and ultrasonic power generators in ratings to 2500 w can be had. Power may be from a 115- or 220-v a-c outlet. Acoustica Associates, Inc.

(More New Products on page 186)

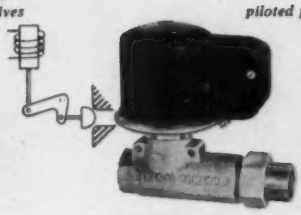
these six basic valves will meet any electric valve requirement you have



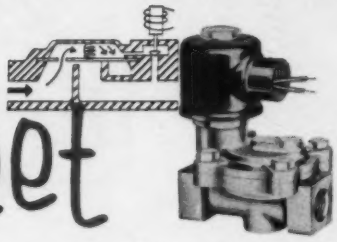
GENERAL PURPOSE
direct acting solenoid valves



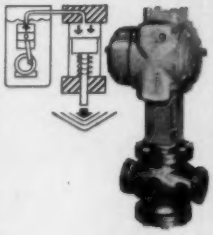
HIGH FLOW
piloted piston solenoid valves



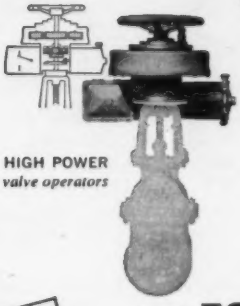
HIGH PRESSURE
lever action solenoid valves



HIGH FLOW
magnetic diaphragm valves



HIGH VOLUME
HIGH PRESSURE
Hydramotor valves



HIGH POWER
Tork-Master valve operators

FROM POWER TOOLS TO HEAVY FLUID TRANSFER

No matter what kind of plant you're operating—metalworking, petrochemical or food processing...General Controls has a complete line of electrically operated valves for every application. A complete line of solenoid valves for machine tools and automatic packaging applications...Hydramotor and Tork-Master valves for high-volume, high-flow operations. Valves for ⅛" to 60" pipe sizes. Relays, counters, switches, and panels, too. Send today for complete catalog on the line that interests you—or call your nearest General Controls factory branch office for full information.

- normally open
- normally closed
- three-way
- four-way
- two-wire or three-wire control
- explosion-proof and weatherproof
- special body and seat materials
- odd voltages AC and DC
- UL, FM and AGA approvals

GENERAL CONTROLS

Automatic Controls for Product or Process

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Six plants—42 factory branch offices serving the United States, Canada and Western Europe

For more facts circle 584 on Reply Card

OPERATING ROOM QUIET is maintained even though a Westinghouse DS-3 dry-type transformer is only a few feet away. "Only well-engineered equipment," states architect Calvin M. Butler, "can achieve both the quiet and constant operation demanded in this location."

Compact new Westinghouse dry-type transformers give "virtually silent" operation in Arizona hospital

Quiet operation and compact construction dictated the choice of Westinghouse DS-3 dry-type transformers for the new Louis Galland Memorial Wing of St. Luke's Hospital in Phoenix, Arizona.

"The importance of quietness in a hospital cannot be overemphasized," comments Mr. Calvin M. Butler, architect of the new wing. "In this instance, the transformers are installed next to the surgical and X-ray rooms where the loud humming often associated with transformers would have disturbed both doctors and patients. The Westinghouse dry-type transformers used here are practically noiseless. No decibel reading whatever can be obtained, even when a meter is placed on the transformer surface."

"In addition to their virtually silent operation," adds Mr. Archie W. Brown, consulting electrical engineer, "these transformers provide a greater margin of safety for overloads and operation in higher ambient temperatures. Yet they are smaller than others designed for the same kva output."

Quiet operation of the DS-3 is assured by use of a new "built-in" mechanical vibration dampening system, which floats core and coils independently of base, case and connecting conduit.

Reduced size—up to 11%—and weight—up to 32%—achieved by use of two Westinghouse exclusives: inorganic Silclad insulation and grain-oriented Hipersil® steel cores.

For full information on the advantages of the DS-3 transformer, call your local Westinghouse salesman or distributor . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70802

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

MODERN APPEARANCE of St. Luke's Hospital in Phoenix is matched by the modern performance of Westinghouse DS-3 transformers inside. This is only one of over 30,000 trouble-free installations of "virtually silent" Westinghouse dry-type transformers. Guaranteed quiet by sound testing every transformer in an ambient of 24 db.

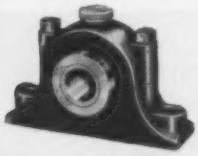
Rigid conduit can be used for the DS-3, with no noise transmission from core and coils. Mr. G. C. Parker, Westinghouse representative, "sound tests" this unit, gets no reading above room ambient even with meter on transformer surface.

For more facts circle 585 on Reply Card

DODGE PRODUCTS you should know

NEW! DYNA-V DRIVES
Save space, weight and cost!

TAPER-LOCK ROLLER CHAIN DRIVES
No reboring — no waiting!



DODGE PILLOW BLOCKS with TIMKEN BEARINGS
America's Quality Pillow Blocks!

•

Write for Bulletins!

- ✓ Dyna-V Drives—selection data.
- ✓ Chain and Sprockets—drive data.
- ✓ Rolling Bearings—ratings, data.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 178)

16—LAMP FIXTURE requires little maintenance

Type VRL is announced as a compact, low-cost vaportight reflector lamp fixture which produces high light output and is suitable for greater than normal mounting heights. According to manufacturer, the receptacle's pigtail leads make installation easy and the fixture requires little maintenance. It takes 300-w medium base R-40 reflector lamp or 150-w PAR-38 lamp. Crouse-Hinds Co.

17—LIMIT SWITCH ARM adjusts to any length

This adjustable limit switch arm is introduced for use on conveyors, machine tools, and various automation equipment. The length of the arm may be varied to fit any specific application, permitting switch to be mounted

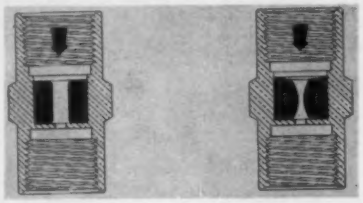
safely out of the path of moving pieces. Built for use on company's Type T heavy duty limit switches, the arm is made of three pieces. The roller portion fastens to a length of ¼ in. key stock, which in turn is inserted into the section fastened to the switch. Key stock may be cut to desired length. Square D Co.

18—COUPLING can be sleeve, pipe repair clamp

Split longitudinally, the versatile Smith Split-Coupling can be used as coupling, split sleeve or pipe repair clamp. Clamping means are provided to resist endwise pull of the pipe when it is used as a coupling. The unit is all steel and can be welded—while pipeline is in service—to become an integral part of the pipeline. It is welded to the pipe by full encirclement welds. Only assembly work required in the field is placing the two halves of the coupling around the pipe and tightening the side bolts. Factory-installed gaskets are held in position so that leaking oil or gas will not displace them during installation. Sizes 2 through 4 in. will be available. The Pipe Line Development Co.

19—FLOW REGULATORS are self cleaning units

Available in eight sizes from 2 through 8 gpm, these flow regulators have brass bodies tapped ½ in. for sizes through 4 gpm and ¾ in. for the larger sizes. Control is obtained by the change in size and shape of the orifice in the rubber member, as



indicated in the illustrations. Flow control under minimum inlet pressure is shown at left; under high inlet pressure, at right. The orifice is self-cleaning by the continual flexing of the rubber member. Manufacturer says the regulators are accurate to ∓10 per cent of the rated size when used within the range of 20 to 125 psi and suitable for temperatures to 160 F. Taco Heaters, Inc.

20—SOLDER-TYPE ALLOY in squeeze bottle

Eutec-Tin-Weld T-1 (AutoChemic) is a solder-type alloy in paste form that can be applied from a plastic squeeze bottle, or through automatic applicator devices in larger production runs. The solder has been formulated to avoid settling out of its heavier activity and performance of the alloy. Eutectic Welding Alloys Corp.

21—WATER HEATER is gas fired, coil type

The Burkay 668 features rust-free construction with all parts in contact with water made of copper, brass or bronze, and a finned heat exchanger for fast response to hot water demands. It is suited for use in industrial plants—in some applications may be installed as a straight recovery, as a booster heater or as part of certain booster recovery systems. Rated at 300,000 Btu per hour and approved for 180 F service, the Burkay is designed to provide recovery at the rate of 288 gph at 100 F rise. It is available for natural, mixed, manufactured, and liquefied petroleum gas. Permaglas Div., A. O. Smith Corp.

(More New Products on page 190)

Torque-Arm

THE DODGE DEVELOPMENT THAT CHANGED THE NATION'S HABITS OF SPEED REDUCTION

America's Most Complete Line of Shaft Mounted Speed Reducers

55 MODELS

- 1 to 200 hp. at 100 rpm!
- Output speeds from 10 to 378 rpm!
- Single Reduction
- Double Reduction
- 5 to 1 Ratio
- 15 to 1 Ratio
- 25 to 1 Ratio
- Any speed ratio up to 150 to 1 obtainable by selection of pre-determined combination of reducer and V-belt drive.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

In fewer than ten years, the range of Torque-Arm Shaft Mounted Speed Reducers has increased from 6 to 55 models, to meet the ever increasing demand for this improved method of speed reduction.

By eliminating foundation, sliding base and flexible coupling this modern speed reducer has saved untold installation time and untold dollars of cost.

The rugged semisteel housing developed by Dodge has never been improved upon. It is corrosion resistant—and it has the strength to hold bearing seats in line for the life of the unit.

Dodge design provides wide spacing for the bearings. Loads are carried easily, contributing to Torque-Arm's long life and very high efficiency. The gears are finest quality—helical, heat treated steel.

Torque-Arm mounts vertically or horizontally in any position around the driven shaft. It locks to the shaft on *both* sides of the housing. The holes in the output hub provide simple removal with puller. Overload release and built-in backstop are optional.

Dodge Torque-Arm is America's most widely used shaft mounted speed reducer. It is stocked by your local Dodge Distributor. Ask him. Or write us for bulletin.

DODGE MANUFACTURING CORPORATION, 2700 Union, Mishawaka, Ind.

DODGE
of Mishawaka, Ind.

For more facts circle 587 on Reply Card

when it's Ilg ventilating equipment...

You can see here some of the reasons why Ilg fans and ventilators last so long—with almost no maintenance. Careful, constant testing makes certain you never have to worry about vibration and noise.

All component parts—Ilg-built motors as well as

Here's why ILG *propeller fans last a lifetime*

Cool, Clean, Quiet. With Ilg propeller fans you get the operating cost advantages of *open-type* motors plus the protection of *totally enclosed* motors. Vent pipe brings in outside air to *pressure-cool* single-phase permanent-split capacitor and 3-phase motors. Casing protects motor windings against deposits. "One-Name-Plate" guarantee covers *both* fan and motor.

Finger-Tip Control. Ilg Type "Q" propeller fan wheels and motors are dynamically balanced to assure vibration-free performance. Ilg-built self-cooled, direct-connected, permanently lubricated motors always run cool, clean and quiet.

For fans built to satisfy your "specs"...

Each Ilg product shown carries the rating seal of the Air Moving and Conditioning Association Inc.

constant checking assures you trouble-free service

fan wheels—are dynamically balanced to assure the vibration-free operation that holds wear to the absolute minimum.

Ilg high-air-volume performers rank high with those who buy, specify, install and operate industrial equipment. For further details on the *complete* Ilg line of electric ventilating equipment, send for Catalog No. 159 on propeller fans, Bulletin No. 257 on *airfoil* centrifugals, Bulletin Nos. 2302 and 2701 on low-silhouette power roof ventilators.

and ILG centrifugal fans with little maintenance

"Check-Out" Time. Every Ilg-built centrifugal fan wheel—with backward curved (BC) blades and *airfoil* design—must, pass dynamic balancing "check-out" tests before being direct-connected to 3-phase motors or to permanent-split capacitor single-phase motors.

Streamlined for Smooth Flow. Large air-intake area . . . gently curved inlet contour . . . combine to assure smooth intake of air. No bearing or bearing supports in intake to hamper air flow. Discharge arrangements easy to rotate on the job. No belts or pulleys to slip, realign or replace. For operations to 9" static pressure.

specify ILG

ILG ELECTRIC VENTILATING COMPANY

2832 No. Pulaski Road, Chicago 41, Ill.

Offices in 57 Principal Cities

Member of Air Moving and Conditioning Association Inc. (AMCA)

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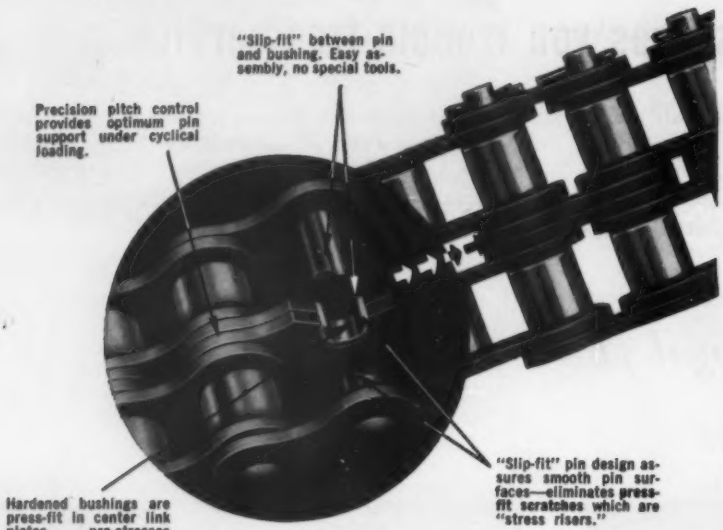
Are you getting all the "extra" values for your chain drive dollar?

FOR EXAMPLE:

"BUSHED CENTER LINK DESIGN"...


"Slip-fit" between pin and bushing. Easy assembly, no special tools.
Precision pitch control provides optimum pin support under cyclical loading.
"Slip-fit" pin design assures smooth pin surfaces—eliminates press-fit scratches which are "stress risers."
Hardened bushings are press-fit in center link plates . . . pre-stresses critical areas for greater fatigue life.

Whitney **bushed center link** design can provide **at no additional cost,** up to a **25% increase in endurance limits,** as compared to other standard chains. This means substantial cost savings on higher horsepower, multiple strand chain drives — assures maximum service life and minimum maintenance.

The "bushed center link" features shown above results in the pre-stressing of link plates for **greater fatigue life, plus** the added advantage of easy assembly or disassembly without special tools. This design feature is carried throughout the Whitney Chain and is **not** limited to connecting or offset links.

AND STILL MORE "ENGINEERED EXTRAS"...

"Line" blanked plates — Whitney Chain plates are blanked **parallel** to the rolling direction of the plate stock. This provides higher fatigue resistance since the areas of highest stress cannot be coincident with possible grain discontinuities.

SHOTPEENED PARTS—Whitney Chain parts are shotpeened over a wide range of sizes. This treatment introduces residual stresses which increase the fatigue life of the parts.

PRE-STRESSED PLATES—Unique compressive technique applied to **heat treated** alloy steel chain links builds in concentrated residual stresses in the pitch hole area for greater dynamic strength.

SOLID ROLLS—Whitney rolls, 1" pitch and up, are turned from special alloy bar stock —**not** formed from strip. These solid rolls stand up under punishing extremes . . . take higher impact loads over many additional hours of service.

Ask your Whitney Field Engineer how these Whitney standards can be applied to your power transmission or conveying problem for the utmost in service and dependability.

Write today for helpful, practical Whitney catalogs.

Whitney
CHAIN COMPANY

A SUBSIDIARY OF FOOTE BROS. GEAR AND MACHINE CORPORATION

412F HAMILTON STREET • HARTFORD 2, CONN.

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVES

For more facts circle 589 on Reply Card

NEW PRODUCTS

(Begins on page 178)

22—PIPE WRENCH works with compounded leverage

One man can do the work of two—and two can do the work of four, according to manufacturer—with the Ridgid Compound Leverage Wrench. Pressure applied on the malleable

handle is multiplied by two as the adjustable hook jaw turns the pipe in one direction, while the offset chain vise head grips the fitting and exerts equal pressure in opposite direction. By slipping the removable chain vise head into place on the desired side of the handle, wrench can be used to tighten or loosen right or left hand threads, with pipe on either side of fitting. Wrenches come in sizes for 2- to 8-in. pipe. The Ridge Tool Co.

Use the Reader Service Cards provided on page 263-264 to ask for more information on the products. Circle item numbers of products in which you are interested.

23—SILICONE GREASE is rust inhibitant, too

For mated threaded or non-threaded ferrous components and fabricated rubber parts, Compound SS-4007 is said to maintain consistency from —75 to 300 F, and serve in many applications where other products would solidify or be subject to oxidation, evaporation or excessive bleed losses. Primary applications include use as a high and low temperature thread lubricant, corrosion preventive compound, and rubber lubricant for low and medium swelling components, such as O-rings. Among benefits reported is corrosion protection—SS-4007 is chemically inert, and protects metals against air oxidation. After 70 hr at 212 F in air, no pitting or cor-

For more facts circle 590 on Reply Card ——>

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN METALWORKING: Huge industrial cranes with P&H Electronic "Stepless" Control are used to handle the largest metalworking shop loads with ultra-fast speed, yet with damage-eliminating gentleness. Where duty cycles permit, smaller, moderately priced P&H cranes handle a host of lifting jobs with plenty of muscle, but low investment.

All the mechanical and electrical parts for both big and small P&H cranes are made by and warranted by P&H. We promise undivided responsibility — not a service "run-around". When we sell it, we service it — and our interest in your crane stays active as long as it is on your runway!

Isn't that the assurance you want on your next crane? Bulletin C-6, "P&H Industrial Cranes," is packed with photos and facts showing how P&H installations service *your* industry. Write Dept. 102, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

75TH YEAR

P&H HARNISCHFEGER

...quality and service for 75 years

WHEN PRECISION PRODUCTION RIDES THE HOOK...

On a crankshaft production line, even slight damage to a crankpin can mean an expensive piece of scrap — something no manufacturer can afford.

That's why this manufacturer uses *close-spotting* P&H Zip-Lifts.

Where every movement is made with hoists, a hoist breakdown means lost production — something no manufacturer wants.

That's why this manufacturer uses *dependable* P&H Zip-Lifts.

And human beings need protection — against electric shock, mechanical failure, poor construction, and other hazards.

That's why this manufacturer uses *safe* P&H Zip-Lifts.

Are *you* now using close-spotting, dependable, safe P&H Zip-Lifts — or are you one of the group of hoist users who is about to switch over to them? Capacities from 250 to 2000 lbs., your choice of mountings. Priced from $200. Write for Bulletin H-20, Dept. 201, Harnischfeger Corp., Milwaukee 46, Wisconsin.

P&H HARNISCHFEGER
...quality and service for 75 years

OUR 75TH YEAR

(Begins on page 178)

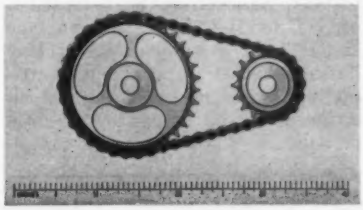
rosion occurs on brass, cadmium plated steel, zinc, magnesium, aluminum and steel coated with SS-4007, manufacturer states, and even salt water will not corrode steel coated with it. Good storage stability and ease of application are stressed—it can be brushed, wiped or sprayed on. General Electric So.

24—MARKED COILS prevent welding wire mix-up

Each coil of this company's automatic welding wire now has the grade stamped on the inside of the liner to assure instant identification. Also, liners on No. 2 coils are color coded —the colored stripe on the inside of the liner indicating the grade. According to manufacturer such identification ends scrapping of partly-used coils with lost tags and possibility of using the wrong grade where coils have been mixed in storage or handling. Page Steel and Wire Div., American Chain & Cable Co., Inc.

25—BUSHING CHAIN permits variety of shaft centers

Diamond Micropitch combines high strength and high resistance to joint wear with minimum size and weight, it is announced. It is designed to permit an infinite variety of shaft cen-



ters, and multiple shafts can be accurately timed because sprockets may engage both sides of the chain. Sprockets and special attachments can be made to specifications. The fine pitch bushing chain is designed for use in electro mechanical equipment, data processing, and other applications. Diamond Chain Co., Inc.

26—WHITE MEMBRANE makes roof repair easier

Exceptional strength is claimed for Tremglas, a white glass membrane for renewing asphalt built-up roofs or for repair of tar and gravel roofs. According to manufacturer, Tremglas is stronger than felt and meets the strength of jute but surpasses it in durability, because Tremglas is a flexible glass membrane of continuous

GO AHEAD...

explain nuisance tripping to him

Heat's on, conditioner's out. How come?

Some annoying power interruptions are due to inadequate wiring. A vast number are due to nuisance tripping of circuit breakers or nuisance fuse blowouts.

Fuses and many circuit breakers operate on the basis of heat. They are sensitive to heat from within the circuit and without. Thus, on hot days thermal protectors are often near the tripping point even though the circuit is not fully loaded. As heat builds up, nuisance tripping results.

Heinemann hydraulic-magnetic circuit breakers *ignore heat*—respond only to *current* (amperage) which is the true determinant of electrical load. These circuit breakers will carry the full, safe capacity on the hottest days. Nuisance tripping just doesn't occur.

In Heinemann circuit breakers, actuation is entirely magnetic; inverse time delay is provided by hydraulic means. When protection is needed, interruption is fast. When the circuit is safe, power stays ON.

For consulting engineers, the full story is given in an informative booklet, Manual 101: "What You Should Know About Circuit Breakers." Write for your copy.

HEINEMANN

HEINEMANN ELECTRIC COMPANY
128 Plum Street, Trenton 2, N. J.

Circuit breakers

SA 1418

For more facts circle 592 on Reply Card

when the going gets rough-

give 'em "L"

When the bite is on the dragline, you'll be glad you rigged with *Leschen*—the wire rope that's the same top quality in every foot of every reel. At Leschen there are new machines with exclusive new continuous-flow technique. Try Leschen Red-Strand Wire Rope. Its uniform quality makes your operation safer, your replacement time farther in the future. *Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Missouri.*

LESCHEN WIRE PORTER ROPE DIVISION

H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

For more facts circle 593 on Reply Card

NEW PRODUCTS

(Begins on page 178)

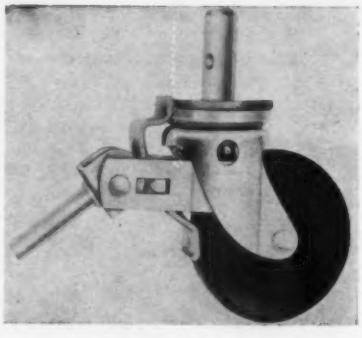
filaments impregnated with an elastic binder and will not rot. The natural luster-white color of Tremglas lets the user see what he is doing—permitting him to apply a controlled, even coat over the entire area. Tremglas is described as simple to apply, and conforms to contours and uneven surfaces. The Tremco Mfg. Co.

27—TEFLON-COATED CUPS aid equipment operation

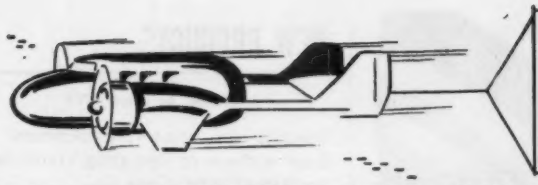
For use in hydraulic and pneumatic equipment, Teflon-coated cups are claimed to reduce the breakaway torque required to operate cylinders; to reduce running friction; not to stick to cylinder walls even after prolonged periods of idleness; and to eliminate packing chatter and squealing. It is pointed out that Teflon, with its low coefficient of friction and anti-adhesive characteristics, has long resisted efforts to use it as a coating. In this technique, a thin layer of Teflon coats the cups and this coating becomes an integral part of the packing. Cost of these cups is reportedly only slightly more than conventional ones. The Garlock Packing Co.

28—SCAFFOLD CASTERS feature double lock

Medium-duty scaffold casters in the CL9000 Series have load capacities of 175 to 500 lb. These stem-type casters have a simultaneous locking device designed to prevent both rolling and swiveling. The all-steel dual-action brake can be operated by foot or hand, it is noted, and it locks in-



stantly and solidly. Design features of the casters include a corrugated top plate hardened for added strength, with a serrated edge for contact with brake shoe. The features are made with 5-, 6- and 8-in. wheels available in eight types—drawn steel, semi-steel, rubber tired, vulcanized, semi-pneumatic, Ruberex, Rockite and



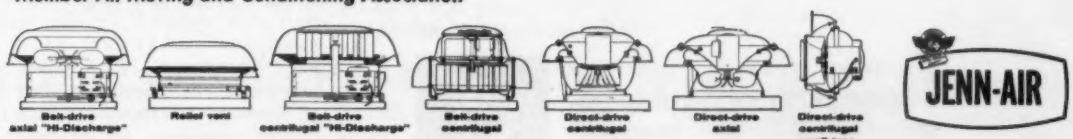
NOW—IMMEDIATE DELIVERY
VIA JENN-AIR
BLUE RIBBON SERVICE

for the exhausters you want . . . when you want them . . . call your Jenn-Air Sales Representative

Waiting for delivery of equipment you need right away can be a schedule-disrupting, money-losing proposition. But you don't have to put up with these delays when it comes to power exhausters. The giant new Jenn-Air warehouse shown above is stocked with all sizes and models of Jenn-Air Quiet-Tested Exhausters . . . ready to ship as soon as your order comes in. Chances are you can get immediate delivery even on large quantity orders.

There has never been any compromise with quality in the manufacture of Jenn-Air products. The best of materials and the utmost skill are a part of every unit from engineering through production to final "Vibronic Eye" testing. Now this Blue Ribbon Jenn-Air quality is teamed up with Blue Ribbon immediate delivery service to make Jenn-Air—more than ever—first choice among ventilating equipment specifiers.

Member Air Moving and Conditioning Association



JENN-AIR

Jenn-Air Products Company, Inc. • 1102 Stadium Drive, Indianapolis 7, Indiana

For more facts circle 594 on Reply Card

SURVEY REVEALS INDUSTRY'S NO. 2 SKIN HYGIENE PROBLEM: TOUGH SOIL REMOVAL

Here's help on the problem from SBS

A recent survey of 2,177 major plants pinpoints industry's most serious skin hygiene problems.

1. *SKIN DISEASE and*
2. *REMOVAL OF TOUGH SOILS*

Naturally, the second contributes to the first. Because tough soils invariably lead to the use of harsh cleaners and solvents when proper cleaners aren't handy. Heavy greases, resins, tars, and similar soils resist ordinary skin cleaners, and when the worker finds he can't remove them, he resorts to solvents or other materials that injure his skin. Result: skin disease, poor employee relations, cost and waste.

What can you do? Ask an SBS representative to show you "Operation Pinpoint", 10 minute sound slide digest of the national survey, and you'll see how *a planned corrective program* can solve these skin hygiene problems. Because SBS produces a *complete range of cleansers*, he can suggest the right cleanser for each job. For the safest answer to tough soils, write today . . . Dept. 3-F.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N. J

CANADA: Chemical By-Products, Ltd., Toronto, Ontario

For more facts circle 595 on Reply Card

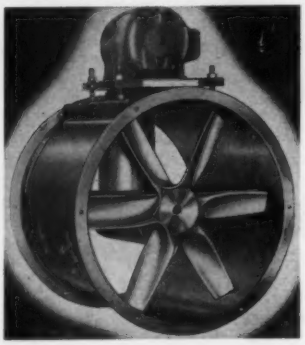
NEW PRODUCTS

(Begins on page 178)

Plaskite—to meet requirements of floor surface or operating conditions. Faultless Caster Corp.

29—DUCT FANS feature speed adjustment, standardizing

Variable pitch drives which permit quick adjustment of fan speed—and thus of fan noise and air volume—are standard equipment on this redesigned line of belt-drive duct fans. Simple adjustment of the driver sheave slows the fan to reduce air



deliveries by up to a third where maximum catalog performance is not required. A second feature is complete standardization of components within each fan size. This means that a change of motors to meet changing air delivery needs requires no modification of the fan and can be made while the fan is still in place in the duct work. Sizes range from 12 to 60 in. Bulletin A-114A gives data. Hartzell Propeller Fan Co.

30—MOTOR OPERATOR for remote breaker control

The Telemand is announced as a compact, rugged and economical motor-operator which can open, close or re-set molded-case circuit breakers. This electrically operated mechanism can be added to ET molded-case breakers in ratings from 70 to 800 amp, incorporated in switchboards, control centers, individual enclosures or other types of installations. Its compact design permits mounting of breaker and operator in a space no wider or longer and only 6 in. deeper than that required for the breaker alone, says manufacturer, and it can be mounted in the field within minutes without modification of the breaker. Economy is stressed—in high fault current situations, for example, the combination of a Telemand with a current-limiting Cordon breaker can

How many spare parts should you stock per pump?

"You may be *over*stocking," says Phil Olmstead, *Chief Engineer*, Goulds Pumps, Inc.

"There are many times," one plant manager told me recently, "when we have a *higher* inventory of spare parts than the people we buy from!"

No laughing matter, this—many plants today are faced with the difficult problem of keeping stocks *adequate*, yet keeping inventories *down*. If your problem is *pump parts*, you can do both—by *interchangeability!*

For instance, take the Goulds Fig. 3405 single-stage centrifugal. You can get it in 33 sizes, with 66 combinations possible, considering right- and left-hand rotation. *Just 3 groups of parts fit all 66 combinations of this pump!*

That means that, for every three to five pumps of a given group size (sizes are divided up three ways into "small," "medium," and "large" groups), we can recommend that you stock just one shaft, one set of bearings, sleeves, mechanical seals or packing. *In short, all parts are interchangeable except casings, casing covers and impellers!*

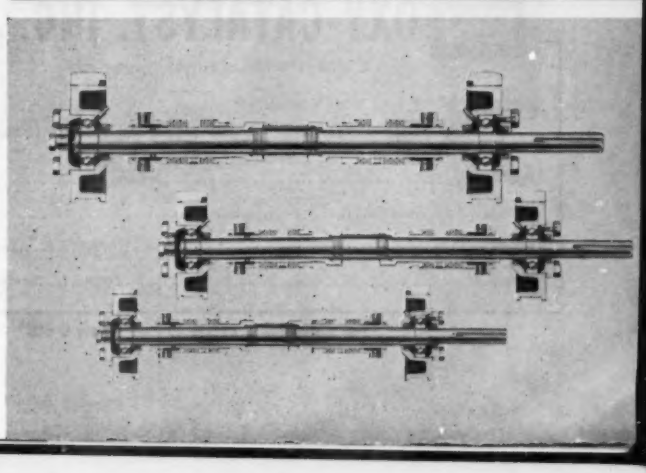
How much can that cut down your inventories? You figure it out—*one* set of group parts for as many as *five* pumps, where you might expect to stock one for each. *Three* groups for *thirty-three* different sizes of pumps—a *91% cutdown!*

And here are three more advantages to consider:

1. You can make changes *in the field* to meet new needs.
2. You receive off-the-shelf delivery of parts you order.
3. Initial cost is lower due to standardization in manufacture.

The next time you talk to a Goulds representative, ask him to show you how interchangeability works in our Fig. 3405 . . . and in the rest of our line, too. If you want information right away, drop a line to me, Phil Olmstead, at Goulds Pumps, Inc., c/o Dept. PE-69, Seneca Falls, N.Y. I'll see that you get all the information you want.

GOULDS GP PUMPS



Just three groups of shafts, sleeves, bushings, glands, packing, ball bearings, bearing shell, end caps, closures and gaskets for Goulds Fig. 3405 pump to fit all 33 pump sizes.

For more facts circle 596 on Reply Card

STOP DEADLY EXHAUST FUMES

LEARN HOW
Send for FREE brochure on OXY-CATALYST Exhaust Purifiers!

Oxy-Catalyst Exhaust Purifiers for gas, LP-gas, diesel engines

ON FORK TRUCKS

STATIONARY ENGINES

POWER SWEEPERS

Profit from increased employee productivity . . . make air safe, clean and healthy. Install exhaust purifiers on materials handling equipment and other indoor engines to change dangerous exhaust fumes to harmless vapor!

Replace present inefficient conventional mufflers. Economical, easy-to-install purifiers available for gas, LP-gas or diesel engines. Optional on new equipment of leading manufacturers.

Only effective way to stop deadly exhaust fumes. Proven in over 1500 plants. Investigate—send today for your free copy of "Exhaust fumes are poison!" Mail coupon below.

CONTROL AIR POLLUTION! Oxycat Systems for industry clean up odors and combustible pollutants with catalytic oxidation . . . often at actual savings! Send for free brochure with full details.

OXY-CATALYST, INC. Wayne 3, Pa., U.S.A.
Catalysts for cleaner, safer air

Please send me your free folder(s) on:
☐ Oxy-Catalyst Exhaust Purifiers to stop deadly engine fumes ☐ Oxycat Systems to stop air pollution

Name.....
Firm.....
Address.....
City.....Zone.....State.....

For more facts circle 597 on Reply Card

NEW PRODUCTS

(Begins on page 178)

often be used to eliminate need for bulkier, more expensive equipment. Bulletin 5047 gives data. I-T-E Circuit Breaker Co.

31—INDUSTRIAL DOOR has shock absorbing bumper

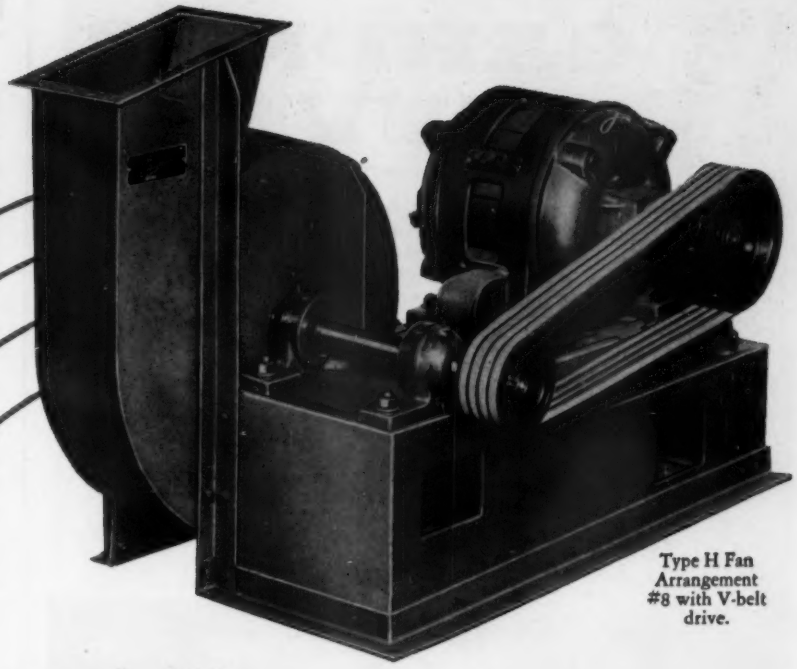
Continual pounding by heavily laden fork trucks will not damage the Clark Shock Absorber Door, it is claimed, because this door is equipped with resilient Urethane-filled bumpers. The bumpers take the full impact—the

trucks don't touch the door proper. Flexibly suspended hinges provide for uniform distribution of stress throughout the length of the door at either side. Constructed to fit standard openings, this door is announced as light in weight, surprisingly moderate in cost. It has a spring return at the top to assure tight closure after each opening, and Neoprene seals to keep out drafts and noise. Clark Door Co.

Reader Service Cards on pages 263-264 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

32—MULTI-PURPOSE LUBE is lithium-based product

Keystone No. 88 has application in 90 per cent of all ball and roller bearing installations, says manufacturer, and produces superior results in plain bearings, needle bearings and on rotating surfaces. It is described as smooth, non-fibrous, homogeneous and odorless—a high film-strength, lithium based product with good water repellent properties and unaffected by exposure to damp atmospheres or



Type H Fan Arrangement #8 with V-belt drive.

if ...you need AIR at relatively high PRESSURES, Bayley Type H Pressure Blowers are made for you!

Bayley Type H Pressure Blowers are designed to withstand operating pressures up to 50 inches W.G.

On Bayley Type H Pressure Blowers, proportions can be varied to obtain almost any combination of air delivery and pressure to meet your particular needs.

★ **if** you have a fan problem, why not talk it over with Bayley? Our engineering department is at your service.

Bayley BLOWER COMPANY

BAYLEY BLOWER COMPANY • 1817 S. 66th STREET • MILWAUKEE 14, WISCONSIN

A DIVISION OF THE GREEN FUEL ECONOMIZER CO., INC.

For more facts circle 598 on Reply Card

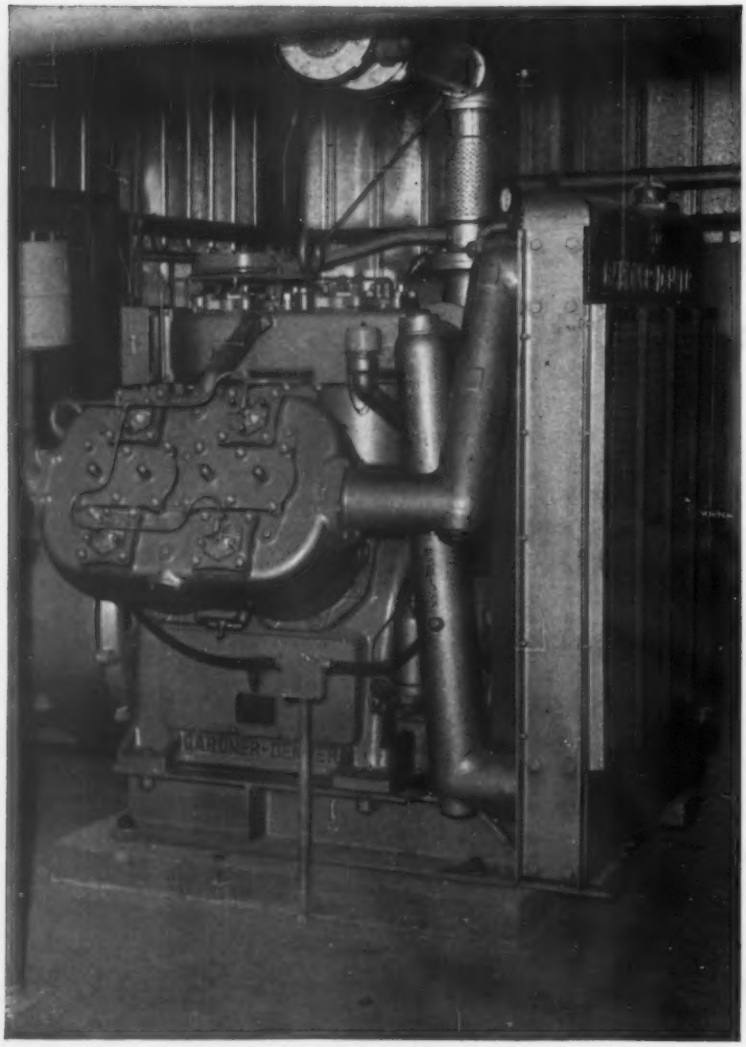
EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER DENVER

Here's the compressor package you can spot in any corner of your plant, hook up and put to work. Foundation specifications are modest. It's a champion on performance, too—noted for two-stage, water-cooled efficiency. And it's a champion with staying power. Years without the touch of a wrench is not unusual for Gardner-Denver quality WB machines. Capacities from 142 to 1150 c.f.m. displacement. Write for Bulletin WB-10, or call your local Gardner-Denver compressor specialist. Gardner-Denver Company, Quincy, Ill.

Space-saving champ

...money-saving winner



For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 178)

direct contact with water. Operating temperature range is given as 0 to 275 F, melting point near 400 F. Keystone No. 88 is claimed to resist erosive effects of hot water and steam, and to be unaffected by mild acid and alkali solutions. Six densities range from medium to XXXX light. Keystone Lubricating Co.

33—WROUGHT IRON for low temperature services

Mn Wrought Iron, named after its principal alloying element, manganese, is introduced as a specialty wrought iron possessing better impact and low temperature properties than most steels. It has been developed to meet requirements for an ecoonmical impact resistant metal in areas of low temperature use, and available in tubular and flat rolled forms at the same price as 4-D wrought iron. It is intended for application in the petroleum, chemical and refrigeration industries and in services involving possibility of brittle failure. It is defined as a highly deoxidized wrought iron, with lowered phosphorous and carbon content, alloyed by addition of approximately 1 per cent manganese. Tests of it are reported to show corrosion resistant, weldability and working properties of 4-D wrought iron. A. M. Byers Co.

34—PLASTIC LETTERS look rich but cost little

These golden-bronze colored plastic letters and numerals are described as having the look of hand cut bronze signwork at a tenth of the cost. They are intended to imitate the dignity of prismatic letters but carry a 30-cents-per-character price. They are cast in deep relief in a tough metallic polystyrene. It requires no maintenance because it is waterproof and does not tarnish, manufacturer states, and a

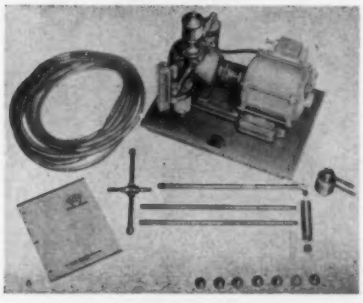
NEW PRODUCTS

(Begins on page 178)

built-in backing of pressure-sensitive Teflon makes it impossible for the letters to deface or disfigure surfaces of metal, stone, glass, wood or plastic. The series comes in four small cap sizes from ¾ to 2 in. For contrast subtitling, the same alphabets can be had in ebony and ivory. Laramie Chemical Corp.

35—DUST SAMPLER measures the dust particles

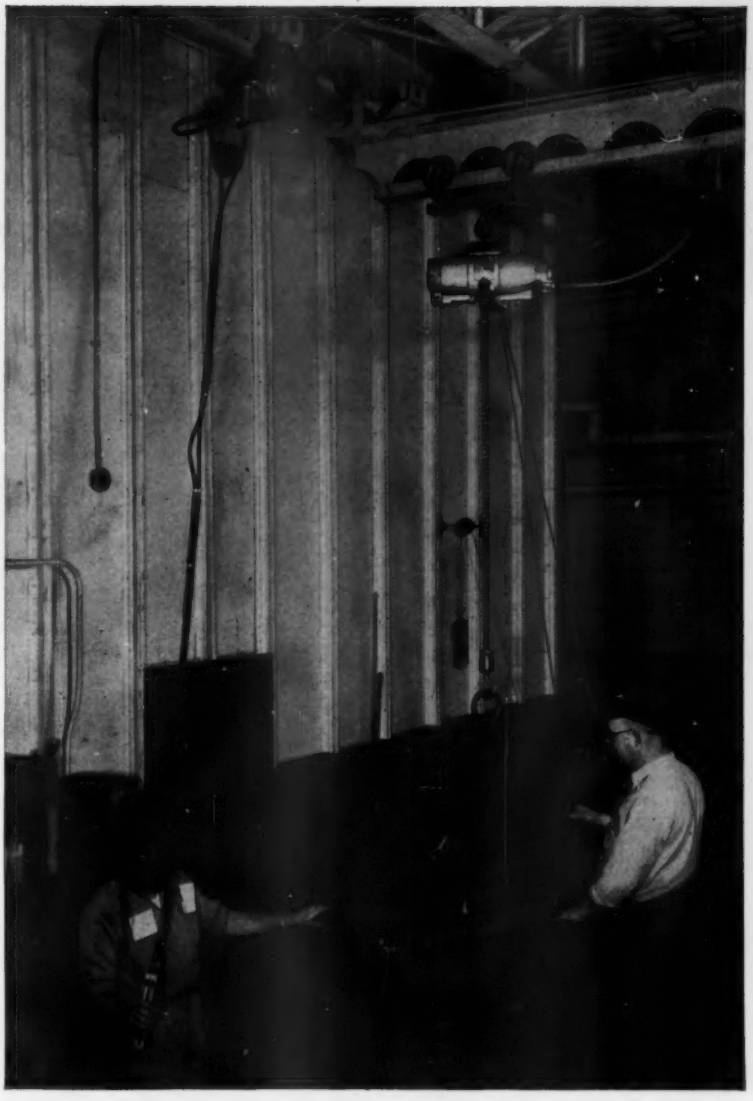
This Iso-Kinetic Dust Sampler is designed to measure dust particles discharged from dust control equipment and to determine equipment operating efficiency. Sampler will measure grains of dust passing through dust



control ducts, or will measure particles being discharged from dust control equipment, such as cyclones and other equipment which exhaust to the atmosphere. Complete assembly consists of a rotometer, air-line filter, air pump, oil reservoir, oil trap, electric motor, plastic air-line tubing, rod handle, graduated rod, filter thimbles, ring seals and nozzles. The Day Co.

36—PACKAGED BOILERS in 400-, 500-, 600-hp sizes

These additions to manufacturer's CB line of packaged fire tube boilers are for heating and processing steam or hot water. They are available for high or low pressure steam and can be fired with oil, gas or combination oil/gas. Features announced include four-pass forced draft construction for high flue gas velocity; high efficiency and less tube cleaning; davited doors; rotary air damper for smooth air modulation without vibration or noise; fully automatic operation with safety controls covering full firing range. A single motor runs caseless fan and air compressor for low pressure air atomizing burner. Low cost gas conversion is announced—oil-fired models have gas burner rings and tappings. Unified electric and steam oil preheater re-



Two-Way Team

spots loads easily, safely

Two-way team for two-way power. The man at the right lifts and moves loads of patterns along 20 feet of traveling bridge. The man at the left moves the entire load (patterns, hoist and beam) to any location within 50 feet of travel. This unusual combination of Gardner-Denver hoist and "Hoistractor" can add economical push-pull power to any materials-handling operation. Write for Bulletins 86-1 (hoists) and 87-1 (Hoistractors).

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

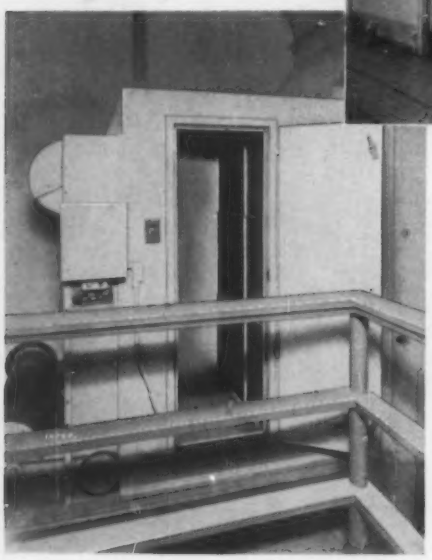
GARDNER DENVER

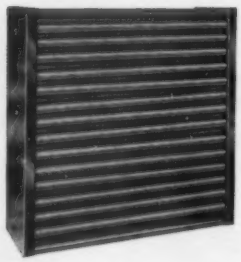
Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts circle 600 on Reply Card

HOW CONNOR dorex® *Protects* EXPENSIVE EQUIPMENT AGAINST CORROSIVE GASES

At the Linden Generating Station of Public Service Electric and Gas Company, Newark, New Jersey, Dorex Air Purification equipment protects the collector rings of the station's large generators from corrosive gases.





Two Dorex installations of six cells each prevent a destructive condition which would cause frequent, costly replacement of brushes and rings.

And in many other utility stations and industrial plants, Dorex guards expensive equipment against such destructive, contaminated gases as sulfur components, organic peroxides, nitrogen oxides, and chlorides . . . and protects personnel.

Dorex acts just like a gas mask, using activated carbon to adsorb air-entrained pollutants. The carbon's purging action purifies the air and readies it for sanitary re-use. Dorex is easily adapted to new or existing duct systems, requiring no more engineering than that necessary for similar incorporation of standard dust filters.

Request new Dorex Bulletin 108A, and ask to have a Dorex representative call . . . Dorex equipment can be the efficient, economical solution to your air pollution problem.

CONNOR... for Constant Comfort Conditions

CONNOR ENGINEERING CORPORATION

DANBURY • CONNECTICUT

CONNOR ENGINEERING CORPORATION dorex® air recovery

For more facts circle 601 on Reply Card

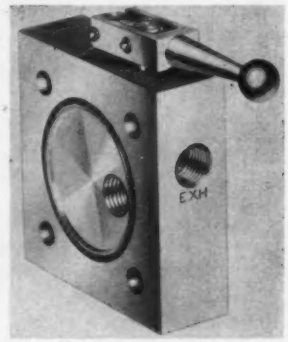
NEW PRODUCTS

(Begins on page 178)

duces piping and radiant heat loss. Each unit is blanketed with fiber glass insulation covered with metal jacketing. Cleaver-Brooks Co.

37—NARROW VALVE is lever operated device

Only 1 in. thick and 3 in. wide, the Lever Operated Slim Line Valve is streamlined in appearance and suitable for mounting in limited space. These valves are designed for air, oil or water service, pressures to 125 psi, temperatures to 150 F. They are available tapped for ⅛- or ¼-in. pipe



connection. Manufacturer points out that these valves are readily adapted to a variety of applications and offer many advantages due to their small size and mounting flexibility. They are furnished in three- and four-way actions, manually operated both directions or spring recut return.

These valves have solid aluminum housing, stainless steel plunger. Low maintenance is stressed. O-rings can be removed and replaced easily and at low cost. The valves can be manifolded together without special parts in any of four 90-deg angle positions. Up to eight can be operated simultaneously from a single supply, or up to 16 from two lines. Hunt Valve Co.

38—FLOOR PATCH resists acids, alkalis and oils

P-D-Q Floor is a quick drying patching compound announced as combining epoxy resin with other corrosion resistant ingredients to provide a strong, long wearing surface. It protects against acids, alkalis and oils, says manufacturer, and may be used indoors or outdoors. P-D-Q is said to bond to concrete, brick, stone, wood, steel or even glass block, and be ready for light traffic within 6 hr, heavy trucking after drying overnight. It is claimed not to chip or

For more facts circle 602 on Reply Card →

Why Hunter Packing Company uses STANOIL Industrial Oil

Two reasons: (1) STANOIL is a superior oil. (2) Along with STANOIL, Hunter Packing receives experienced lubrication technical service.

A special antioxidant in STANOIL gives the oil resistance to *chemical* change. Deposits are minimized. The oil has a high viscosity index, is resistant to *temperature* change. It lubricates effectively at both high and low temperatures. Due to special refining techniques, STANOIL will not readily emulsify. A special additive minimizes foaming. STANOIL has a low pour point. It flows freely at low temperatures. A rust inhibitor in STANOIL "plates out" on metal surfaces.

W. P. "Sandy" Wehking, the Standard Oil man who calls on Hunter Packing Company, has plenty of experience in technical service work. He's been at it for 17 years. Sandy studied chemistry at Blackburn College. He has also completed the Standard Oil Sales Engineering School.

To get more information about STANOIL Industrial Oil and to obtain technical help on your lubrication problems, call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write, **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
STANOIL Industrial Oil

- Antioxidant gives oil resistance to chemical change, minimizes deposits.
- Inhibitor "plates out" on metal surfaces, prevents corrosion.
- Receives special refining to eliminate emulsion problems. Contains additive to minimize foaming.
- High viscosity index. Resists temperature change.

You expect more from STANDARD *and you get it!*

Temperature check. Frank Persson of Hunter Packing Company and Standard Oil lubrication specialist W. P. "Sandy" Wehking inspect one of four compressors in Hunter plant that uses STANOIL Industrial Oil.

- **5000 Counts Per Second**
- **Instantaneous Recycling**
- **Increased Reliability**
- **Industrial Design**

A versatile group of transistorized production counters designed for industrial applications. Any number of decades can be furnished depending upon your requirements.

Can be operated by non-technical help merely by setting the selector knobs to the pre-set quantity within the range of the instrument. These counters are ideal for batch control, sequential predetermining, or accurate length control in such applications as packaging, coil winding, slitting, stacking and material handling.

The use of transistors means that heat — the enemy of reliability — has been eliminated. This reduces warm-up time and increases dependability. Printed circuits and simplified wiring further insure long trouble-free operations.

Standard counters are completely enclosed in attractive industrial cases, but can also be supplied without enclosures for panel mounting. A photo head to actuate these counters can be furnished in many configurations. Batch totalizers with push-button reset and special modifications of basic components can be furnished on request.

This is your complete package for predetermining counting at high speeds. Send for your copy of the new specification bulletin outlining the complete range of the series 1604 counter line today.

Everyone can Count on

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New York • Los Angeles • San Francisco • Montreal
Offices and Agents in Principal Cities

For more facts circle 603 on Reply Card

NEW PRODUCTS

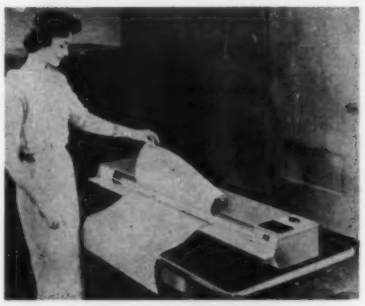
(Begins on page 178)

crack even under pressure of steel wheels carrying heavy loads, and may be given a non-slip finish where desired. It requires no heat or preparatory bonding applications and may be applied directly to a clean surface. It comes in ready-to-mix units weighing about 50 lb—enough to cover an area of 50 sq ft with a coating ⅛ in. thick. Maintenance Engineering Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 263-264.

39—DIAZO REPRODUCER is compact and economical

Advantages of black-on-white copying are available at low cost with Copyflex Model 42. Manufacturer says the unit is priced no higher than an office typewriter and makes positive prints for a penny apiece. Tracings up to 42 in. wide by any length can be made. With the machine turned



on and the speed dial set, you insert the tracing and a sheet of Copyflex paper. Seconds later, the sensitized paper is delivered by the machine, ready for spray application of an odorless developer. The unit has a fluorescent lamp for increased economy. Its mechanical speed range is 3 to 36 in. per minute. Copyflex Model 42 is only 6½ in. high, 12 in. deep and 56 in. long—you can place it on a table or hang it from a wall. Charles Bruning Co., Inc.

40—HAND CREAM sprays on a "protective glove"

Made with lanolin and glycerine, Protex-A-Hand comes in an aerosol can in foam cream form. You spray it on and rub it in. Application before starting work is claimed to seal out dirt, grease, solvents, paints, chemi-

For more facts circle 604 on Reply Card →

LENNOX "OG" SERIES

COMBINATION BURNER HAS "PUSH BUTTON" CHANGEOVER

Operates equally well with either gas or oil

Here is a completely new type of power burner obtainable as a straight gas burner, a straight oil burner, or a combination burner for either gas or oil. For the combination burner, gas and oil are introduced at two separate points in the same firing assembly. To change from one fuel to the other, you simply throw a switch and it is unnecessary to make any further adjustments.

The outstanding performance and common sense construction of these burners is typical of the "OG" Series heater. For the complete story clip and mail the attached coupon today.

• Typical Sequence of Combination Burner Operation

1. Thermostat calls for heat.
2. Combustion air and induced draft blower starts and runs for 25 seconds providing a pre-purge period.
3. Pilot is spark ignited and must be proven within five seconds by lead sulfide scanner.
4. When pilot is proven, the main gas or oil valve opens.
5. There is now a 10-second trial for ignition period which is also monitored by the scanner. Pilot flame is then extinguished.
6. If ignition fails, main burner shuts down immediately.
7. Main flame is continuously monitored.
8. When the thermostat is satisfied, main valve shuts off. Combustion and induced draft blower continues to run for 30 seconds providing a post-purge period.

LENNOX "Task-Matched" Equipment to condition and control air for industry

64,000 to 2,000,000 Btuh Units

LENNOX Industries Inc.

Established 1895

Des Moines, Iowa • Marshalltown, Iowa • Columbus, Ohio
Syracuse, N. Y. • Fort Worth, Texas • Salt Lake City, Utah
Decatur, Ga. • Los Angeles, Calif. • Toronto • Calgary

LENNOX INDUSTRIES INC.
Industrial Division, Dept. PE-6
Box 1294, Des Moines 5, Iowa

Please send me—without obligation—complete specifications and engineering data on Lennox Industrial heaters.

Name.....

Company.....

Address..... City.....

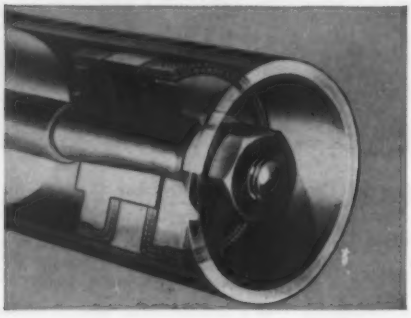
Title.....

PUMCUPS

outlast ordinary packings

3 TO 1

- *in hydraulic and pneumatic mechanisms*
- *in reciprocating pumps*



With Darcova Pumcups...regardless of wear, pressure keeps Pumcups hugging cylinder wall.

Operating costs go down and efficiency goes up when Darcova Pumcups go in! Here's why:

- **Pumcups outlast other packings at least 3 to 1, based on actual reports from users**
- **Fluid slippage is virtually eliminated, because Pumcups operate at full efficiency throughout their entire life**
- **Maintenance costs are reduced, because you have fewer replacements, less downtime.**

Available in three textures—hard, medium and soft. Also in regular or 100% nylon composition. Size ranges from ¾" to 20". For *all* the facts on Darcova Pumcups, write for Bulletin 5503.

DARLING VALVE & MANUFACTURING CO.
Williamsport 14, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
TRADE MARK
PUMCUPS

For more facts circle 605 on Reply Card

NEW PRODUCTS

(Begins on page 178)

cals, oils etc. At the end of a work period it can be washed off, along with accumulated grease and grime. Protection lasts about 4 hr, it is stated and regular use tends to heal rough hands. Protex-A-Hand comes in two sizes; the larger holds about 225 applications. Acrolite Products, Inc.

41—SPRING MOUNT has an all-rubber housing

Type LR, a machinery mounting incorporating steel springs as the vibration-and-shock absorbing medium is designed partciularly for application where noise is as great a problem as vibration—as in air conditioning, heating and ventilating. A feature is all-rubber housing to prevent transmission of structure-borne high-frequency

disturbance and noise. Primarily intended for use with fans, cooling towers, piping, packaged air conditioners, air handling units, turbines and motor generator sets, the Type LR is reported equally effective in protecting machine tools, instruments and precision equipment from vibration and shock generated by other apparatus. The mounting can carry loads from 150 to 1400 lb per isolator and has a minimum operating height of 4 in. Opposed S-slots in the base of the unit permit it to be removed from an installation simply by rotating 45 deg. The Korfund Co., Inc.

42—CLEANING AGENT is solvent-detergent-emulsifier

Teclene, a yellow liquid of the viscosity of light mineral oil, forms clear solutions with chlorinated solvents, most safety solvents, and water. It may be used straight in many cleaning operations to blend with oil and grease, and then flushed off with water. It may be added to other solvents to make them water rinsable. Or it may be used straight or with

Change hats
with your maintenance man . . .

You'll find out . . .

Vertical Lift Magne-blast Breakers have low center of gravity, won't tip over

Find a moment soon to ask the man who maintains your metal-clad switchgear which power circuit breakers are easiest to handle.

He'll tell you he prefers General Electric Vertical Lift Magne-blast Breakers because they have a low center of gravity, aren't awkward and difficult to draw out. Vertical lift Breakers are nearly impossible to tip over, reducing the possibility of breaker damage, injury to personnel and disruption of production. General Electric Company, Schenectady 5, New York. 511-33

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 606 on Reply Card

Sweet 1 production Music at Columbia Records Plant...

Thanks to a

SPENCER

PNEUMATIC CONVEYING SYSTEM

Vacuum producer pulls pellets into separators (at right).

Production line of record presses fed by Spencer system.

From plastic pellets to completed discs, there is no manual handling of materials here at the Columbia Records plant, Bridgeport, Conn.

Pellets are picked up at the pelletizer, conveyed to a large hopper. From there, material is blown through a piped circuit to small "feed" hoppers on each automatic record pressing machine.

Advantages of the Spencer system are many and measurable:

Savings on Material Handling Costs—Manual and mechanical hopper-loading is eliminated, man-power freed for productive tasks.

Increased Production—No "down time" on record presses due to lack of material.

No Contamination of Material—Dirt, metal chips, glass, etc. cannot enter the piped system.

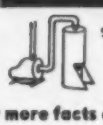
For recommendations (and suggested piping lay-out) on a SPENCER system to solve your needs, write outlining your requirements.

Request Bulletin No. 143-B

The SPENCER TURBINE COMPANY

HARTFORD 6, CONNECTICUT

ALSO MANUFACTURERS OF:



STATIONARY VACUUM SYSTEMS

PORTABLE VACUUM CLEANERS

BLOWERS

For more facts circle 607 on Reply Card

NEW PRODUCTS

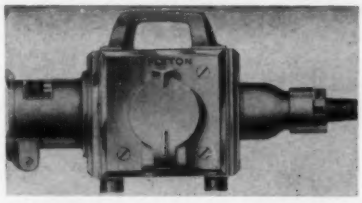
(Begins on page 178)

modest amounts of water to permit rinsing with a suitable solvent.

According to manufacturer, Teclene has no flash point, may be brushed or sprayed on a surface and allowed to stand for several minutes —then hosed off with water, forming an emulsion carrying both solvent-soluble and water-soluble soil. Teclene is said to contain no chlorinated solvents and to be much less hazardous in use than many common solvents. Highly concentrated, it may be used full strength or diluted. Although alkaline, Teclene may be used on all metals, it is stated and will not attack aluminum. Besides cleaning metals and machinery, it is suggested for removing oil or grease from concrete floors. Teclene is described as low in odor. Tect, Inc.

43—CURRENT TAP for use in the hazardous areas

Although primarily designed for use in hospital operating rooms, the explosion-proof Type CPSCT Current Tap has industrial application (Class I Groups C and D locations) as a means of avoiding cords running



haphazardly from awkwardly placed outlets. This current tap has three branch receptacles, each employing the dead-end principle to isolate exposed contacts from live inner contacts for explosion-proof protection. The three pole receptacles take company's standard Type CPP Form I plugs. Current tap housing and covers are made of non-sparking materials as is handle. Appleton Electric Co.

44—BURGLAR ALARM works quietly round the clock

The Teletronic Security System is announced as a 24-hr silent burglar alarm system which links subscribers directly to their local police departments—enabling law officers to hear the actual robberies and take immediate action. It also enables the police department to turn on lights in the subscriber's premises while the burglar is there. The system consists of a central console at police headquarters and a subscriber's con-

For more facts circle 608 on Reply Card ——→

NOW! Plan your building in color with new Alcoa Alumalure!

Alcoa adds low-cost color to the benefits of building with aluminum. New Alcoa® Alumalure lets you choose from 11 standard colors of baked enamel on aluminum building sheet. Along with aluminum's traditional advantages—light weight, corrosion resistance and economy—you'll gain the exciting appeal of color that transforms any building into a showplace. Be among the first to get the facts on Alumalure*, Alcoa's latest contribution to architecture. A telephone call to your local Alcoa sales office will bring you complete information.

FREE!

Color-Swatch Folder illustrates all 11 exciting Alumalure colors. Get it from your local Alcoa sales representative or write on your company letterhead directly to: Aluminum Company of America, 2068-F Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

Specify Alumalure!

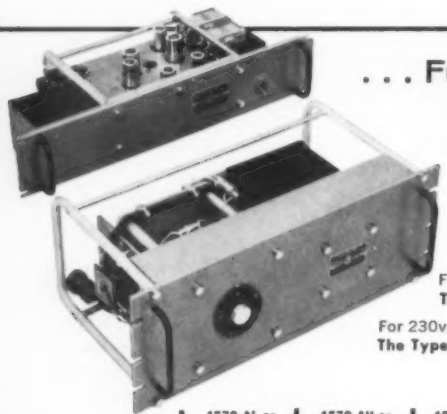
**Trademark of Aluminum Company of America*

50 ampere

Servo-Type **LINE-VOLTAGE REGULATOR**

- ★ Handles up to 500 Amperes on Short-Period Overload
- ★ Holds Line Voltage Constant to ±0.25%
- ★ *NO* Waveform Distortion
- ★ *NO* Power Factor Restrictions
- ★ *NO* Relays to Cause Transient Pulses or Chattering
- ★ Can Be Connected to Handle 10% or 20% Line-Voltage Variations
- ★ Output Voltage Can be Varied ±10% from Nominal Voltage
- ★ All in a 0.9 Cubic-Foot Package

For 115v, 60-cycle lines **The Type 1570-AL . . . $490**
For 230v, 60-cycle lines **The Type 1570-AH . . . $510**
50-cycle models are available



. . . Fully Militarized Regulators with Separate Control and Regulator Units

same features as standard model plus:

- ★ Meet Requirements of MIL-E-4158B and MIL-E-16400
- ★ Easy to Maintain . . . All Circuits Readily Accessible
- ★ Highest Reliability Components Throughout

For 115v, 45-55- and 55-65-cycle lines
The Type 1570-ALS15 . . . $670

For 230v, 45-55- and 55-65-cycle lines
The Type 1570-AHS15 . . . $690

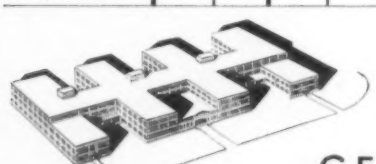
Type Number	1570-AL or 1570-ALS15 115v		1570-AH or 1570-AHS15 230v		1570-ALS25 115v, 3 phase		1570-AHS25 230v, 3 phase	
Correction range in percent of output voltage	1570-AL ±10% / 1570-ALS15 ±9%	±20% / ±18%	1570-AH ±10% / 1570-AHS15 ±9%	±20% / ±18%	±9%	±18%	±9%	±18%
Output current in amperes	50	25	20	10	25 (Output current per phase)	12.5	10	5
KVA	5.75	2.9	4.6	2.3	8.6 (wye connected) / 5 (delta connected)	4.3 / 2.5	6.9 / 4	3.5 / 2
Correction accuracy in percent of nominal output voltage	±0.25%	±0.5%	±0.25%	±0.5%	±0.25%	±0.5%	±0.25%	±0.5%
Correction speed in volts per second	10	20	20	40	5	10	10	20

New

THREE-PHASE MILITARIZED MODEL FOR REGULATION OF BALANCED SYSTEMS

A three-gang motor-driven Variac controls three phases simultaneously in response to variations occurring in one phase. Where balanced lines or loads are not available, three single-phase 1570-A Regulators should be used.

For 115v, 45-55- and 55-65-cycle lines
The Type 1570-ALS25 . . . $865
For 230v, 45-55- and 55-65-cycle lines
The Type 1570-AHS25 . . . $885



We've Moved
To Our New Plant and Main Offices

Write For Complete Information

GENERAL RADIO COMPANY

WEST CONCORD, MASSACHUSETTS

NEW YORK AREA
Broad Ave. at Linden
Ridgefield, N. J.
N. Y. WOrth 4-2722
N. J. WHitney 3-3140

CHICAGO
6605 W. North Ave.
Oak Park, Ill.
Village 8-9400

PHILADELPHIA
1150 York Rd.
Abington, Pa.
HAncock 4-7419

WASHINGTON, D.C.
8055 Thirteenth St.
Silver Spring, Md.
JUniper 5-1088

SAN FRANCISCO
1182 Los Altos Ave.
Los Altos, Cal.
WHitecliff 8-8233

LOS ANGELES
1000 N. Seward St.
Los Angeles 38, Cal.
HOllywood 9-6201

IN CANADA
99 Floral Pkwy.
Toronto 15, Ontario
CHerry 6-2171

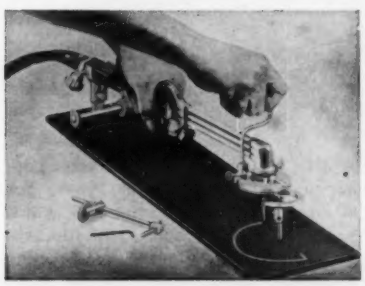
For more facts circle 609 on Reply Card

(Begins on page 178)

trol unit installed at each location to be protected. Units are connected by telephone wires. After working hours, electronically operated switches, placed in strategic spots, serve to transmit a silent alarm to police headquarters when the burglar unknowingly activates signals upon his forced entry. It is explained that should the burglar cut a wire before entering the protected premises, lights come on at the instant of entry and a monitoring device notifies police. Teletronic Security Systems, Inc.

45—SIMPLE TOOL cuts holes, shapes in metal plate

Costing about $40.00, Or-O-Co is introduced for cutting precision holes and various shapes in thick metal plate. The tool attaches to an acetylene cutting torch for such applica-



tions as cutting holes through metal walls for pipe and electrical conduit. Squares, rectangles and odd-shaped holes and solid figures can also be formed for metal fabrication, says manufacturer, and because of this tool's small size, it will operate in confined spaces. Ideas, Inc.

46—CHARGING PACKAGE for electric hand trucks

Available in 12- and 18-v assemblies, the Fulpowr is a complete power package comprised of battery and charger for all types of electric hand trucks. Battery dimensions are standard and the battery can be charged without removal from the truck. The small silicon-type charger is designed for various size batteries, and is available in single-phase 120- or 240-v, 60-cycle a-c service. It can be plugged into a standard outlet. To provide access to the cells, the top mounted Fulpowr charger rides on split tracks running the length of the battery cover. The split cover, hinged from the center, provides access to the battery. The Fulpowr unit is also available as an

NO MORE WAITING FOR SLING CHAINS

Gone are the days of waiting for new or rebuilt sling chains to reach you from the factory. Now, with all components furnished by your Herc-Alloy distributor, you can have your slings the same day. Leading alloy chain users are doing it. Write us or call your CM Chain Distributor for catalog, prices and assembly chart.

HOW IT'S DONE!

With ***Hammerlok*** Coupling Links, anyone who can drive a nail can assemble or rebuild a sling chain in minutes. No peening! No welding! ***Hammerlok*** is rugged ...reusable...safe. Endorsed by leading alloy chain users.

CM CHAIN

COLUMBUS McKINNON

CHAIN CORPORATION

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NEW YORK • CHICAGO • CLEVELAND • SAN FRANCISCO • LOS ANGELES

Warehouses: San Francisco, Los Angeles, Portland, Salt Lake City and Dixon, Ill.

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HERC-ALLOY® HAMMERLOK®

For more facts circle 610 on Reply Card

SEE FOR YOURSELF HOW

OSPHO®

PREPARES RUSTED METAL FOR PAINTING...

Send for FREE Test Sample

Eliminate sand-blasting or flame-cleaning. Simply brush off loose rust and apply OSPHO on the rusted metal surface. One application *kills* the rust and provides a *sound* base for your regular maintenance paint. Rust action is stopped — paint jobs last much longer.

OSPHO is *not* a primer — *not* a paint. It is a carefully balanced phosphate chromate metal treatment which chemically changes rust (iron oxide) into iron phosphate — an inert, hard, gray surface ideal for painting.

OSPHO provides excellent coverage . . . a gallon treats up to 600 square feet. And cost is low. Available in 1-gallon containers (in cases of 4), 5-gallon pails, 50-gallon barrels. Colorless, non-toxic, non-flammable. Available through distributors.

Repeat orders over the past 16 years are proof of OSPHO's effectiveness. *See for yourself . . .*

Write Now For FREE Test Sample
(on company letterhead)
and descriptive literature

TREATS NEW METAL TOO!
When applied on new ferrous metal, galvanized iron and aluminum, OSPHO imparts a slight etch to the metal, insuring tight bond of the paint coat that follows.

ONLY OSPHO KILLS THE RUST

RUSTICIDE PRODUCTS COMPANY
3125 Perkins Avenue • Cleveland 14, Ohio

QUALITY MAINTENANCE PRODUCTS SINCE 1917

For more facts circle 611 on Reply Card

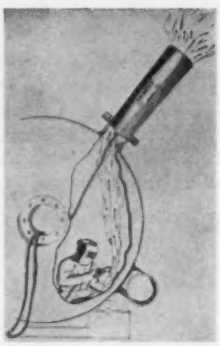
NEW PRODUCTS

(Begins on page 178)

itnernal mounted charger for installation in areas where trucks are operating. Gould-National Batteries, Inc.

47—FUME REMOVER is simple, inexpensive

For exhausting welding fumes from closed work areas, the Air Mover is an uncomplicated device, cylindrical in design. It is powered by ordinary compressed air from the shop line, and utilizes a modified venturi principle to remove smoke, fumes and hot



air. Operation requires merely connecting it to an air line, positioned at an opening of the vessel in which welding is being done, or of the area to be cleared of fumes. By directing a current of air out, it draws fresh air in through other openings and thereby provides a continual supply of fresh air. A feature noted is low noise level during operation. Manufacturer of the unit says its cost is but a fraction of that of other equipment performing the same work. Arcair Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 263-264.

48—PNEUMATIC COMPUTER indicates pressure ratio

Model PR-O is a pneumatic pressure-ratio computer designed to measure compressor inlet and outlet pressures while simultaneously calculating the ratio of the two. Features announced include wide range, flexibility, accuracy and pneumatic signal transmission. The instrument indicates pressure ratio on an integral scale and generates a pneumatic signal

"SWING-BOLT" *Fulflo* FILTER CUTS YOUR PLATING COSTS

Now . . . the new Fulflo Rubber-Lined Steel Filter for plating cuts your filter maintenance costs in half, while providing tank turnover up to 3 times per hour.

New swing-bolt cover simplifies and speeds up changing elements. Just loosen the bolts, swing them out of the way, and lift off the cover to provide complete access to the patented Honeycomb Filter Tubes. Tubes are completely changed in a matter of minutes.

New bottom outlet allows for quick, easy cleaning of entire vessel simply by addition of a "T" connection with drain valve. You save time and labor.

Best of all, new engineering and production refinements enable us to offer this filter at an even lower price than the previous model.

The new Fulflo Rubber-Lined Steel Filter is offered in six sizes, with from 6 to 60 Honeycomb Filter Tubes, for capacities up to 18,000 gph. Steel or stainless steel containers are also available.

It will pay you to look into this new Fulflo Filter to improve plating quality at lower cost.

For qualified engineering advice, or new technical literature, write to Department PG

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

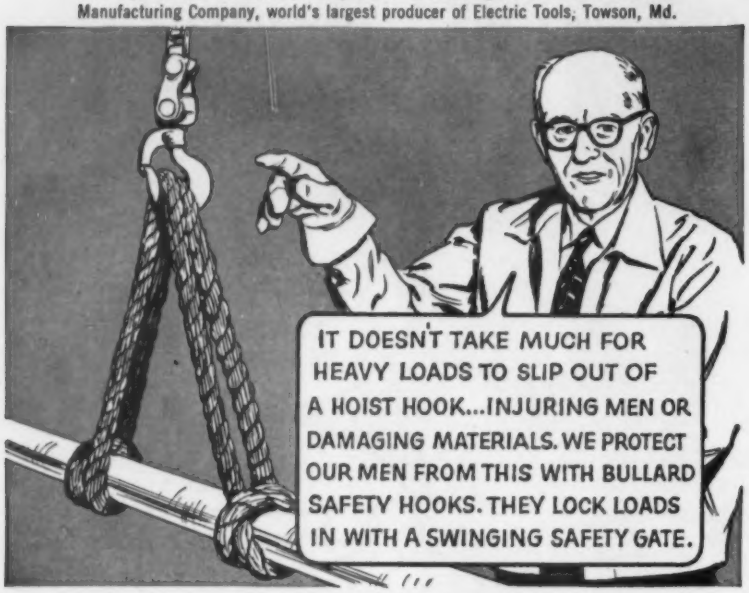
Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

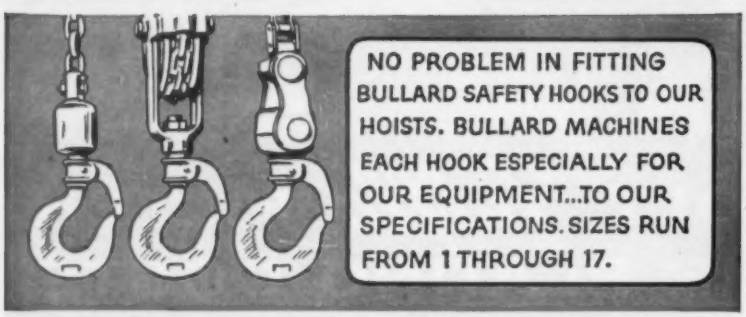
CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

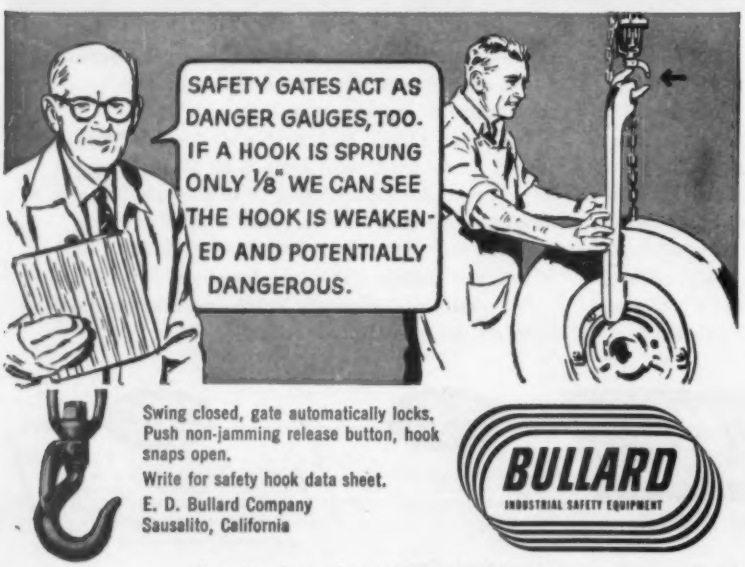
For more facts circle 612 on Reply Card

WHEREVER WE HAVE HOISTS.... WE HAVE MECHANICAL SAFETY INSURANCE!

. . . says Charles S. Smickle, Safety and Health Manager of the Black & Decker Manufacturing Company, world's largest producer of Electric Tools, Towson, Md.


IT DOESN'T TAKE MUCH FOR HEAVY LOADS TO SLIP OUT OF A HOIST HOOK...INJURING MEN OR DAMAGING MATERIALS. WE PROTECT OUR MEN FROM THIS WITH BULLARD SAFETY HOOKS. THEY LOCK LOADS IN WITH A SWINGING SAFETY GATE.


NO PROBLEM IN FITTING BULLARD SAFETY HOOKS TO OUR HOISTS. BULLARD MACHINES EACH HOOK ESPECIALLY FOR OUR EQUIPMENT...TO OUR SPECIFICATIONS. SIZES RUN FROM 1 THROUGH 17.


SAFETY GATES ACT AS DANGER GAUGES, TOO. IF A HOOK IS SPRUNG ONLY 1/8" WE CAN SEE THE HOOK IS WEAKENED AND POTENTIALLY DANGEROUS.

Swing closed, gate automatically locks. Push non-jamming release button, hook snaps open.

Write for safety hook data sheet.

E. D. Bullard Company
Sausalito, California

BULLARD
INDUSTRIAL SAFETY EQUIPMENT

For more facts circle 613 on Reply Card

NEW PRODUCTS

(Begins on page 178)

proportional to pressure ratio for use in a control system. Pressure elements are available for use over a continuous range from 0 absolute to 500 psgi. Under normal operation conditions, ratios of 1 to 5 can be measured throughout a pressure turn down range of 20 to 1. Measured ratios may be increased as the ratio of maximum pressure values increases. Output signal, in the ranges of 3 to 15 and 0 to 30 psig, may be used for recording of indicating instruments or for actuating elements of an automatic control system. Details are in Bulletin MSP 103B. Controls Div., Hagan Chemicals & Controls, Inc.

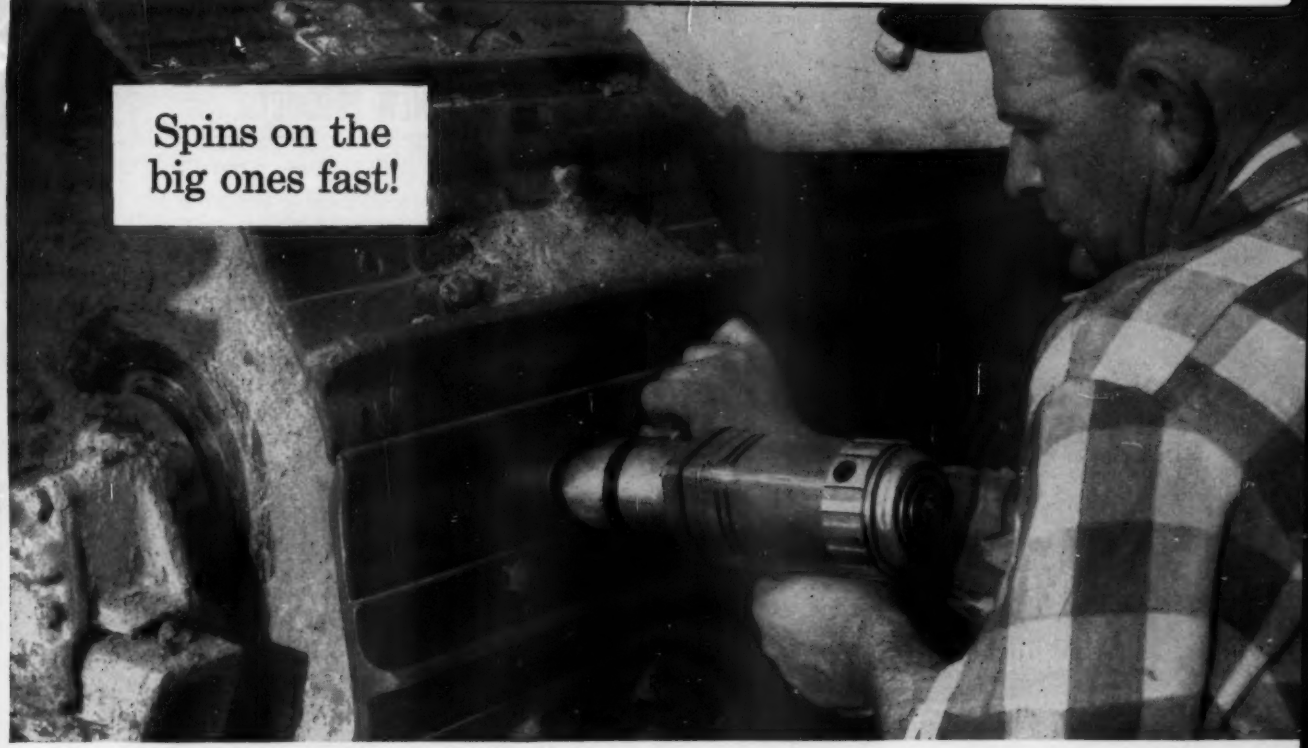
49—FIRE ALARM is compact and self contained

This self contained alarm is designed to howl like a banshee when temperatures reach 135 F—giving a warning that can be heard for 1/5 mile. No

electrical plug-in is required—it operates on two regular flashlight batteries. It measures only 2¾ in. wide, 5½ in. high and 1½ in. deep, can be hung on a wall. It's finished in a soft gray, costs around $5.00 without batteries. Namrok Associates.

50—FLOW INDICATOR for heating, air conditioning

Thermoflo Indicator, an improved hydronic device for indicating flow of water in gallons per minute through a hot water heating or air conditioning installation is said to be quiet in operation. Other advantages announced include no moving parts, low pressure drop, never more than two Monoflo fittings, and an easily-read scale. Two soldered connections and a square-head cock are all that's needed for installation. Versatile mounting plus a scale and housing adjustable to 90-deg intervals, makes it possible to install this indicator practically any-



B&D 300 Impact Wrench slashes equipment down-time!

MORE POWER PER POUND: this lightweight (only 13 lbs.) tool really packs a powerful punch!

LONGER LIFE! Torture tests show it has higher performance, cooler running, longer life than competition.

EASIER HANDLING! Pistol grip positioned to eliminate nose or tail heaviness. No starting torque twist. All-position auxiliary handle.

NO. 100 IMPACT WRENCH: the rugged wrench for smaller applications; hits maximum torque in just six seconds!

See for yourself! Mail coupon today for free demonstration.

A 3c stamp will bring you a demonstration of the tool that slashes tractor pad replacement time from hours to minutes—takes the back-break out of a tough job! Users report it's a cinch—just burn off the old head, punch the bolt through. Then, insert new bolt and run it up—*fast*—with the new B&D No. 300 Impact Wrench!

Packing a minimum of 300 ft. lbs. of torque and capable of handling bolts as large as 1¼" effortlessly, this new B&D power-built tool has thousands of uses. Use it for structural steel sub-assembly and final assembly; to remove heavy, dirt-encrusted truck lugs. Look about you. Chances are you'll find many uses for this tough, versatile tool! THE BLACK & DECKER MFG. CO., Dept. 0806, Towson 4, Md. (In Canada: Brockville, Ontario.)

Look Under "POWER-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

Black & Decker®

Quality Electric Tools—Power-Built to set the pace

MAIL COUPON FOR FREE DEMONSTRATION

The Black & Decker Mfg. Co., Dept. 0806, Towson 4, Md.

☐ Please arrange a demonstration of your new No. 300 Impact Wrench.

☐ Send additional information.

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

For more facts circle 614 on Reply Card

1. Subox is the only paint in America made with suboxide of lead. Because it continues to be chemically active after drying, it gives more anti-corrosive protection — clings better to the small surfaces of fence wire. A single coat lasts many years.

2. Subox makes fence painting easy and economical. It can be brushed or sprayed on, but it is applied especially fast with a roller or an ordinary floor broom.

3. The most popular shade of Subox (Subalox 508) closely resembles weathered galvanizing. It is an ideal spot paint for all galvanized surfaces. Subox also is available in a wide range of modern pastel and dark colors.

Write today for technical literature, color card and the booklet "Simplified Fence Painting."

SUBOX PAINTS

Subox Inc.

Established 1924
19 Fairmount Plant, Hackensack, N. J.
Subox Company of Canada, Weston, Toronto 15

For more facts circle 615 on Reply Card

NEW PRODUCTS

(Begins on page 178)

where, in either vertical or horizontal position. Six sizes range from 1 to 3 in., with capacity ranges from 1 to 10 gpm for the smallest, to 60 to 300 gpm. Manufacturer says that this device is particularly suited for determining flow rates of pumps having a flat capacity curve. It is also suited for indicating rates of flow through cooling towers and heat exchanger equipment. Bell & Gossett Co.

51—BAND SAW cuts wide range of materials

This 20-in. metal-wood cutting band saw has a variable-speed drive for cutting everything from stainless steel to aluminum, wood and plastics. The drive gives the operator a speed range of 50 to 4500 fpm, to assure correct speed for cutting any of 58 different materials. Speed is set by turning a

handwheel. Blade guides on this saw are designed to provide longer blade life and more accurate, straighter cuts. The top blade guide supports the blade down to the top surface of the work, and the lower guide supports the blade to within 13/16 in. of the lower surface of the work piece. Other features announced include a ribbed table, 24¼ by 24¼ in. which rests on two widely spaced trunnions, 17 in. apart, and side take-out slot for the blade which allows the front table trunnion to be placed in front of the blade where work load is greatest. Chip blower, motor and switch are standard on single- and three-phase models. Delta Power Tool Div., Rockwell Mfg. Co.

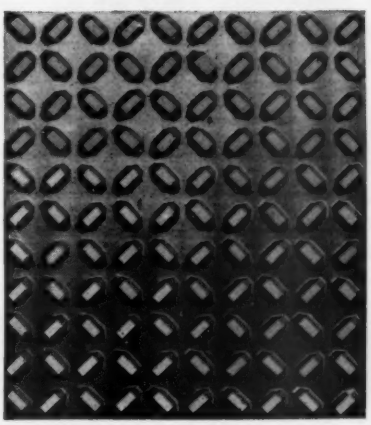
52—FLOOR ABSORBENT for oily, greasy locations

Auto-Dri, an economy-grade mineral floor absorbent is intended for use only where higher absorbent efficiency is not required. It is a granular attapulgite which automatically absorbs

One slip can cost more than USS Multigrip

$100,000 for a single fall? Sounds fantastic, doesn't it? But there are actual cases involving suits for $100,000 or more for single falls. The average cost of injuries from slips and falls is lower than that, of course. In six states, during 1954, the cost per fall averaged close to $900.

You can eliminate many slips and falls by giving your workers a floor studded with cleats—USS Multigrip. This floor plate provides safe traction in any direction. The cleats are flat on top, easy to walk on—and do not catch the shoe.



For machine shops, loading platforms, cat-walks, and other dangerous locations, Multigrip supplies safety plus.

Where floors take a heavy beating from traffic, Multigrip will stand up for years under constant use. Oil and water won't soak in and can be easily removed from the surface with regular cleaning materials. You save money by having a floor that is easy to sweep or flush clean—and there's little or no maintenance.

On your next inspection trip, search out the danger spots—and make them safe with USS Multigrip.

USS is a registered trademark

Sold by leading distributors from coast to coast.

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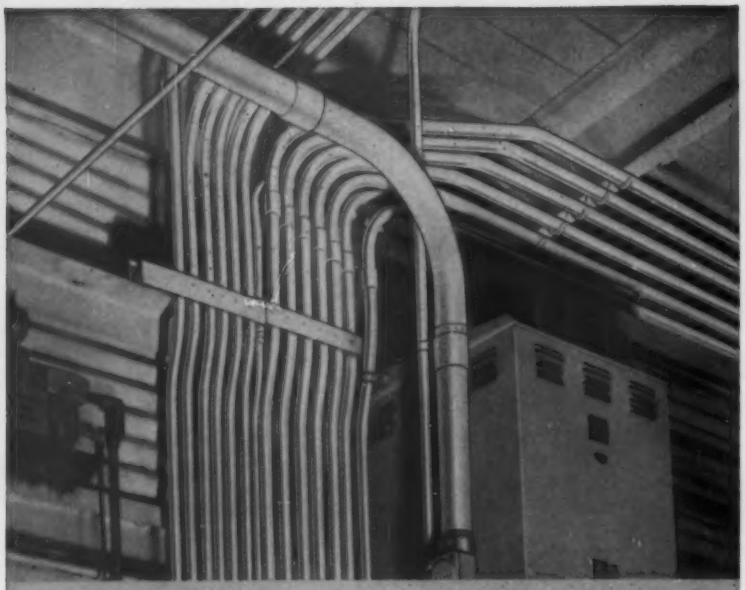


REYNOLDS ALUMINUM Electrical Rigid Conduit

cuts installation and maintenance costs!

Reynolds Aluminum Electrical Rigid Conduit offers *five* important benefits: **1. LIGHTWEIGHT.** Aluminum conduit weighs approximately two-thirds less than steel conduit. Installation is faster, easier. **2. CORROSION-RESISTANT.** Aluminum cannot rust—ever—and is corrosion resistant to water, weather and most industrial atmospheres. There are no periodic protective maintenance problems, no rust on walls or surrounding fixtures. No rusting threads. **3. NON-MAGNETIC.** With aluminum conduit, voltage drop is reduced. Longer conduit runs or smaller conductors are possible. **4. EASY-WORKING.** Aluminum conduit bends and forms quickly and accurately to meet and by-pass obstacles found in many installations. **5. NON-SPARKING.** Aluminum will not spark from accidental contact with hard objects. Perfect for use in inflammable areas and atmospheres.

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

For more information and names of Reynolds Aluminum Electrical Rigid Conduit outlets, call your nearby Reynolds Sales Office or write *Reynolds Metals Company, Box 2346-EQ, Richmond 18, Virginia.*

Also write for descriptive brochure.

Watch Reynolds TV show—"WALT DISNEY PRESENTS"—every week on ABC-TV

For more facts circle 617 on Reply Card

NEW PRODUCTS

(Begins on page 178)

liquids, and since it does this without becoming mushy, Auto-Dri provides a slip-proof surface, it is noted. It can be spread by rake or broom to clean oily or greasy floors and can be swept up for use again. It is noncombustible says manufacturer, and will protect wood or composition floors from sparks generated by welding, grinding or other metalworking operations. Speedi-Dri Div., Minerals & Chemicals Corp. of America.

53—A-C VOLTMETER is portable, battery operated

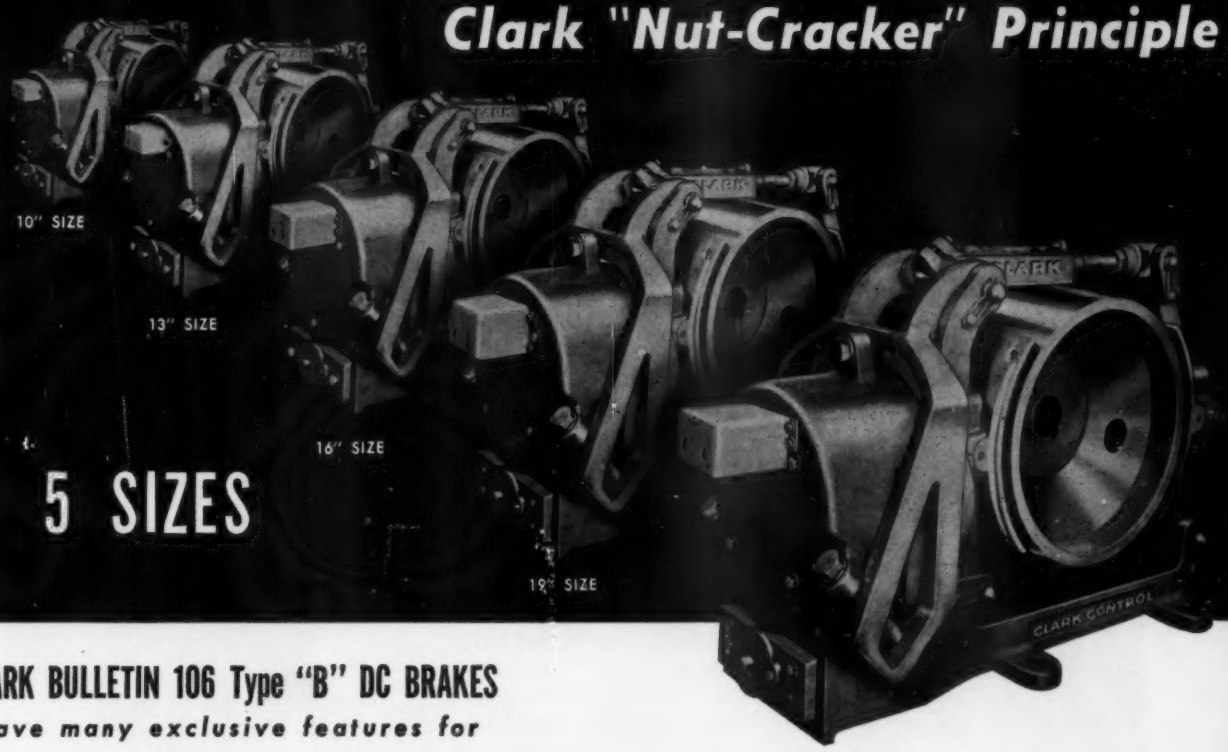
This low cost, transistorized battery operated a-c voltmeter is introduced to provide laboratory performance and range combined with easy portability. Selling at $165.00, the unit has full scale readings of 1 mv to 300 v in 12 ranges with an essentially

flat frequency response of 20 cycles to 1.5 megacycles. It has a DB scale and "battery OK" scale. This voltmeter can be used to design, test, install, adjust and service electrical and electronic equipment of many types. Accuracy is given as within ± 5 per cent up to 1 megacycle and the unit is useable as an indicator up to 5 mc. Power supply of standard batteries provides more than 400 hr of operation. The unit weighs about 5 lb, is only 5-by-5-by-10., is housed in a steel case. Motorola Communications & Electronics, Inc.

54—TESTING UNIT shows thicknesses, diameters

This relatively inexpensive device is designed to detect thickness or diameters of any product that can be run through it. Although developed to accommodate wire or cable up to 1 in. diam, flat material such as paper, or a similar sheet or web can be gaged by running the edge between the rollers. Material is measured by passing it between a set of rollers, the bottom one being stationary. Movement of the upper roller is said to

CLARK offers a New, Improved Line of AISE-NEMA BRAKES . . . with the proven Clark "Nut-Cracker" Principle



5 SIZES

CLARK BULLETIN 106 Type "B" DC BRAKES

have many exclusive features for

- MORE DEPENDABLE OPERATION
- EASIER MAINTENANCE
- GREATER SAFETY

Built to AISE-NEMA standards for use with 600 series mill motors, this new line achieves economies in size without sacrificing ruggedness. These brakes retain the famous Clark "NUT-CRACKER" principle which has proved successful on heavy-duty industrial applications over many years. It assures more dependable operation and longer lining life by providing equal distribution of shoe pressure on the brake wheel. Simplicity of mechanical operating linkage means fewer parts to maintain and simpler adjustments.

FEATURES

- All maintenance adjustments made from the top.
- Single adjustment for air gap. Built-in indicator.
- Magnet case and coil easily removable and replaceable without disturbing brake adjustment or releasing brake.
- Coil replacement easily done on the job. Epoxy encapsulated coils.
- Simpler and easier shoe replacement.
- Wheel and motor armature easily removable as a unit without disturbing brake adjustment.
- Equal distribution of shoe pressure for more positive braking.
- Self aligning shoes for even distribution of lining wear.
- Torque setting unaffected by lining wear. Built-in torque indicator.
- Cast-steel construction throughout.
- Nitralloy bushings with hardened pins.
- Captive hairpin cotter retainers at all pivot points.

For Complete Information Write for Bulletin 106 B

The CLARK CONTROLLER Company

Everything Under Control

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IN CANADA: CANADIAN CONTROLLERS LIMITED • MAIN OFFICES AND PLANT, TORONTO

For more facts circle 618 on Reply Card

GTC PROVED RELIABILITY

IN-PLANT COMMUNICATION SYSTEM

FIRST MAJOR INSTALLATION PLACED IN SERVICE IN U. G. I.'s LUZERNE ELECTRIC DIVISION'S HUNLOCK CREEK GENERATING STATION

February 1958

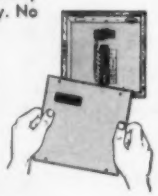
Since that time, the GTC system delivered constant, uninterrupted service. New plant unit will include extension.

This installation, as well as thousands of GTC units that have been installed in power stations and industrial plants throughout the United States since, have definitely established the superiority and reliability of GTC in industrial voice communications.

Features contributing to GTC's acceptance and reliability are:

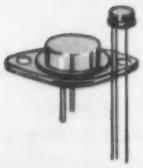
1. Provides swift and sure voice communication even in adverse environmental conditions, such as extremes of temperature and noise.

2. All amplifiers are "plug-in" contributing greatly to ease of installation and maintainability. No central equipment is required.



3. Long-life transistors and rugged, industrial type components are used throughout. No vacuum tubes or "entertainment" type components are employed.

4. Inconvenience and expense of vacuum tube replacement is eliminated.



5. Design allows expansion of system from "very small" to "very large" by simple addition of units where required.

6. Ultra simple wiring plan (no shielded cables) and unitized equipment with integral terminal facilities make for easy low cost installation.

*Gai-Tronics Transistorized Communications is an effective, economical industrial communication system designed to provide swift and sure voice communications regardless of distance or surrounding noise conditions.

GAI-TRONICS
CORPORATION
Dept. C
READING, PENNA.

A SUBSIDIARY OF GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS

GTC is extremely flexible in application. Write today for a copy of our completely illustrated, descriptive booklet and name of nearest representative.

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 178)

detect variations in product size to within ±0.005 in. The unit is electronically controlled—a signal light indicates when maximum or minimum tolerances are reached. Adjustable micrometers are located on the detector head for desired minimum or maximum settings. Complete with its own electronic control, this unit is designed to perform such control functions as stopping associated equipment or indicating faults. Wire Insulating Machinery, Inc.

55—INCINERATOR for the smaller sized plants

Model C-7 Portable Incinerator is a 75 lb/hr dry waste unit designed for operation at rated capacity for 8 hr a day. It is claimed to burn efficiently

and without smoke and odors. The unit measures 4 ft 4 in. long, 2 ft 10 in. wide by 5 ft high and can pass through a 36-in. doorway. For installation adaptability, the breeching outlet can be mounted in any of three locations. Model C-7 is steel cased and refractory lined and equipped with steel skids. Plibrico Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 263-264.

56—PACKAGED DRIVES, are adjustable speed units

Polydyne Drives, available in a wide range of outputs and speed ratios, operate on the principle of V-belt-connected, adjustable pitch pulleys. Their modern appearance is typified by the use of company's Tri-Clad 55 motors, helical gear motors and speed reducers. Belt replacement is enhanced by a design providing adequate internal clearances. Also, controls are undis-

How to get more service than you bargain for

Specify rubber maintenance products made of Du Pont neoprene or HYPALON . . . they often outlast ordinary rubber goods. For example:

Neoprene transmission belts withstand high-speed flexing, resist heat and oil, have outlasted other belts 3 to 1.

HYPALON coated nylon tarpaulins will not crack or dry out; highly resistant to abrasion and cutting, yet ⅓ the weight of conventional tarps.

Neoprene conveyor belting carried molten sand and metal fragments for 1 year; other belts last 90 days.

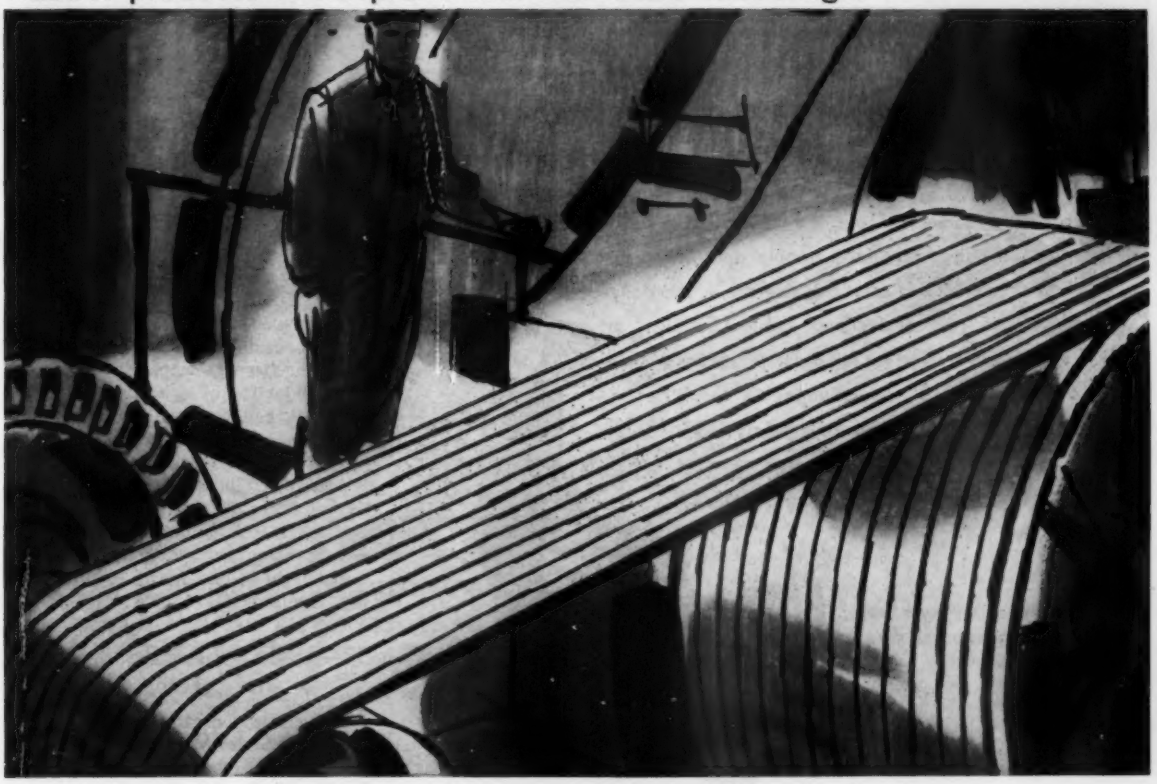
HYPALON hose has carried hypochlorite since May, 1954; ordinary hose broke down in a few months.

This means longer service per dollar, reduced replacement cost and savings in downtime.

Wherever you use maintenance goods of neoprene and HYPALON you are assured of durability, and excellent resistance to a wide range of deteriorating factors. Neoprene, a versatile synthetic rubber, offers good oil, weather and abrasion resistance. HYPALON is a special-purpose synthetic rubber, ozone-proof and impervious to most oxidizing chemicals.

Your local rubber goods distributor handles neoprene and HYPALON maintenance products and can recommend the right product to meet your needs. Take advantage of his knowledge and service by calling him soon. For additional information write for DU PONT ELASTOMERS IN INDUSTRY, E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. PE-6, Wilmington 98, Delaware.

Rubber products of neoprene and HYPALON® last longer



DU PONT
REG. U. S. PAT. OFF.

SYNTHETIC RUBBER

NEOPRENE
HYPALON®
VITON®
ADIPRENE®

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

* *Trademark for Du Pont Synthetic Rubber*

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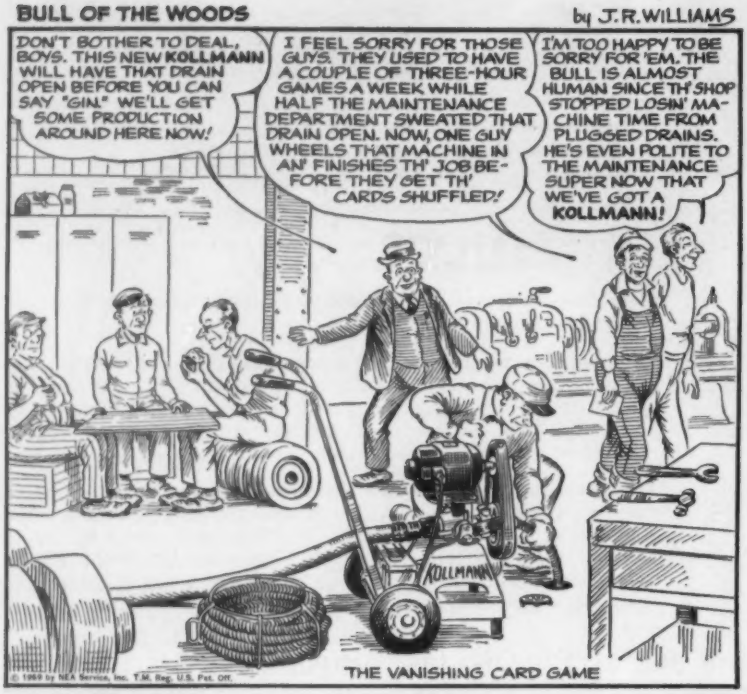
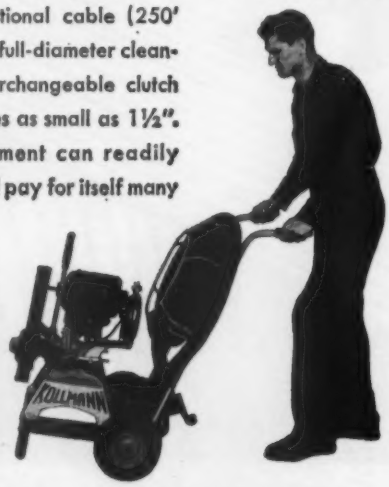

BULL OF THE WOODS
by J. R. WILLIAMS
DON'T BOTHER TO DEAL, BOYS. THIS NEW KOLLMANN WILL HAVE THAT DRAIN OPEN BEFORE YOU CAN SAY "GIN." WE'LL GET SOME PRODUCTION AROUND HERE NOW!
I FEEL SORRY FOR THOSE GUYS. THEY USED TO HAVE A COUPLE OF THREE-HOUR GAMES A WEEK WHILE HALF THE MAINTENANCE DEPARTMENT SWEATED THAT DRAIN OPEN. NOW, ONE GUY WHEELS THAT MACHINE IN AN' FINISHES TH' JOB BEFORE THEY GET TH' CARDS SHUFFLED!
I'M TOO HAPPY TO BE SORRY FOR 'EM. THE BULL IS ALMOST HUMAN SINCE TH' SHOP STOPPED LOSIN' MACHINE TIME FROM PLUGGED DRAINS. HE'S EVEN POLITE TO THE MAINTENANCE SUPER NOW THAT WE'VE GOT A KOLLMANN!
KOLLMANN
THE VANISHING CARD GAME

YES, THE KOLLMANN "500" CLEARS *Any* STOPPAGE QUICKLY...THOROUGHLY...

● Designed for industrial use, the "500" makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted "500" handles up to 150' of sectional cable (250' with larger power units) for full-diameter cleaning of lines 3" to 10". Interchangeable clutch jaws quickly adapt it to lines as small as 1½". *Every* maintenance department can readily justify this machine... it will pay for itself many times over.



See the full Kollmann line at your distributor, or write for literature.

KOLLMANN
MANUFACTURING COMPANY
Erie, Pennsylvania • Phone: Erie 99-1102
Leading Designer and Manufacturer of Drain Cleaning Equipment Since 1936
For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 178)

turbed and belt tensioning is automatic and immediate, it is pointed out. According to manufacturer, the control design is of special interest since the actuating force is directed through an "equalizer" which prevents binding or sticking of the speed control function. These drives are offered from ¼ through 25 hp (a-c) in output speeds from 5 to over 4000 rpm, with a standard speed variations of two, three, four and five to one. Maximum speed variation (from 6:1 at 25 hp to 10:1 at 1 hp) is also available. General Electric Co.

57—ATTACHMENT lets trucks work in narrowest aisles

The STOW (side transfer optimum warehousing) System is based on an attachment which fits any standard counterbalanced fork lift truck and permits the operator to pick up or discharge his unit load without the

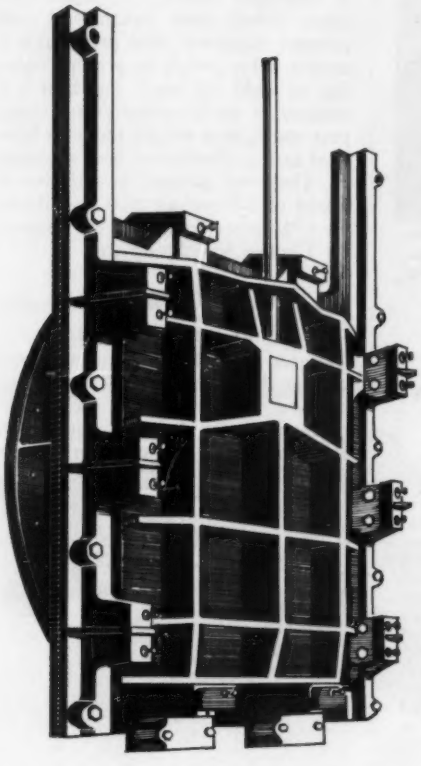
usual 90-deg turn. Benefits of the system, according to company, are increased storage capacity resulting from reduction of aisle space required for truck handling, and more efficient use of manpower and trucks. An aisle only inches wider than the load size is required. Channeled racks support the attachment during the cycle of operation, it is pointed out, and load weight being shifted cannot become unbalanced in picking up or discharging. Equipment Mfg. Co., Inc.

58—UNIT HEATERS designed to work quietly

Eight gas-fired centrifugal units heaters in the Series MB, are intended for installations requiring a low noise level, and offer capacities from 50,000 to 250,000 Btu/hr input. The blower is forward-curve, double-inlet type designed to provide large air volumes at low tip speeds. Fan wheels are dynamically balanced and continuous-duty constant-speed motors are mounted on a cushion base and pro-

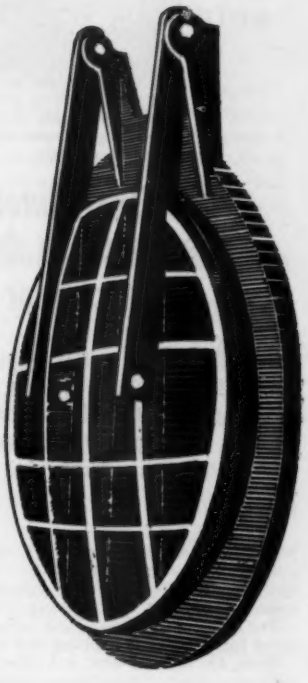
New steels are born at Armco

There's an Armco Gate to meet *Your* Needs



World's most complete range of *SLUICE GATES*

... and *FLAP GATES*



PLUS

a complete line of roller and radial gates, light duty slide and turn-out gates, and meter gates. Send for the Armco Gate Catalog. If you have a specific job in mind, check box in the coupon and our representative will call. Armco Drainage & Metal Products, Inc., 6849 Curtis Street, Middletown, Ohio.

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Send my copy of the 96-page Armco Gate Catalog.

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The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

For more facts circle 622 on Reply Card

C&D AutoCal*
Unitized Power-Pack

Popular mounting arrangement shows how *AutoReg*® Silicon Charger mounts inside switchgear cubicle door with controls projecting through. No manual switching or other adjustment required. PlastiCal® batteries need watering only once a year.

New C&D *AutoCal** *unitized* Power-Pack is specially designed for dependable switchgear tripping and control

Simple *AutoReg*® voltage regulated, current limiting Silicon Charger, paired with long-life PlastiCal® battery, assures high-capacity d-c power in compact package that is virtually *maintenance-free.*

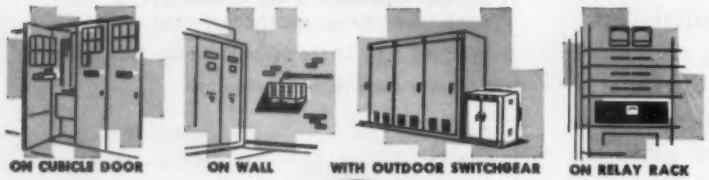
Now, utilities and industrial plants can guarantee an even greater margin of reliability and protection for switchgear and control equipment. The amazing new C&D *AutoCal unitized* Power-Pack always assures full power for tripping and control.

Here, for the first time, is a dependable, high-capacity power package *specially designed for tripping and control.* Virtually maintenance-free . . . with no manual switching or adjustment required . . . *AutoCal* provides many times the life of ordinary battery and charger combinations which may be *adapted* to this critical service.

AutoCal pairs the simple, compact *AutoReg* Silicon Charger with powerful PlastiCal lead-calcium-grid control batteries. A sudden demand for tripping power merely discharges the battery over a short period. While the breaker is tripped, PlastiCal supplies any necessary constant load current as might be required for the operation of pilot lights, holding coils, and similar requirements. Once the circuit is reclosed, *AutoReg* puts energy back into the battery at a high rate until it levels off at full charge.

Here's self-protected charging . . . no charger adjustment or maintenance . . . and 25-year-life PlastiCals only require watering once a year!

For full details—write for Bulletin AR-102 today!



ON CUBICLE DOOR | ON WALL | WITH OUTDOOR SWITCHGEAR | ON RELAY RACK

C&D

Since 1906

C & D BATTERIES, INC.
of Conshohocken, Pa.... Attica, Ind.

Sales and Service Offices in Principal Cities from Coast to Coast

Manufacturers of *Dyne-Cal*® Industrial Batteries • PLASTICELL* and PLASTICAL® Batteries for Communications, Control and Auxiliary Power • Producers of *Autoflog*® Silicon Chargers

**Trademark; AutoReg® Silicon Charger and PlastiCal® Battery.*

For more facts circle 623 on Reply Card

NEW PRODUCTS

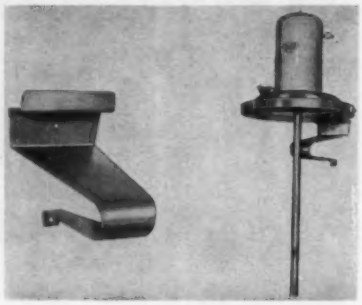
(Begins on page 178)

vided with automatic reset thermal overload protection. Burners are raised-port type.

These heaters can be controlled by a room thermostat; a summer-winter switch is included. They incorporate a high-limit switch, automatic gas valve, safety pilot switch and gas-pressure regulator. Also provided is a blower delay switch to prevent blowing of cold air until the heat exchanger is up to temperature. Compact and light in weight, the units have steel casing, aluminized heat exchanger. They use natural, manufactured, mixed or LP- gas-air mixtures. Bulletin 1501 gives details on the heaters. Ilg Electric Ventilating Co.

59—WALL BRACKET holds pump for drum change

Designed to hold a lubricant pump off the floor while drums are being changed, this steel wall bracket eliminates need for hoisting equipment, company says. The operator merely



hooks the drum cover flange on the bracket while he slides in a fresh drum of lubricant. Bracket includes two mounting holes, top and bottom, for securing to any type surface with 5/16-in. diam bolts or screws. Lincoln Engineering Co.

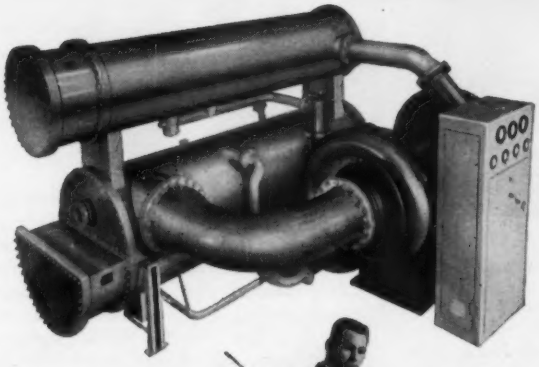
60—ENCLOSED SWITCH has variety of applications

Catalog 2CX3 is UL listed as being raintight and explosion proof, manufacturer announces. This switch is designed for use on fuel handling equipment, valve control systems and other hazardous outdoor installations. It is reported capable of withstanding a 100-hr salt fog test. Electrical capacity is 20 amp, 125, 250 or 460 v a-c. The switch has an aluminum die-cast housing and dome cover. There is a ring-type seal on the actuator shaft and between the cover and case, and the stainless steel lever arm actuator has a non-sparking roll-

Climate by Chrysler

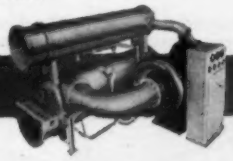
...most versanomical way to air condition anything!

Versanomical—that's the word for Chrysler's Centrifugal Water Chiller. It's versatile: engineered for any air conditioning project from 125 hp to the largest. And economical: packed with special engineering features that cut operating and service costs. For example:



1. **True volute casing.** A Chrysler design exclusive that minimizes refrigerant turbulence . . . reducing horsepower load on the motor.
2. **Adjustable guide vanes.** Unique airfoil design employs new principles to increase compressor efficiency to the maximum while maintaining operating stability.
3. **Automatic Operation.** Factory-assembled control console including all required safety controls, indicator lights and gauges.
4. **Automatic purger.** Removes non-condensable gases and water vapor. Prevents contamination of refrigerant system, cuts service costs.
5. **Interlocked lubrication.** System protects motor bearings with a constant flow of oil. Compressor can't run unless oil pump operates.

Chrysler Centrifugal Water Chillers are factory pretested under simulated operating conditions to assure peak performance. Why not get all the facts from your local Chrysler Applied Machinery and Systems sales office. Or write: Airtemp Division, Chrysler Corporation, Dept. V-69, Dayton 1, Ohio.



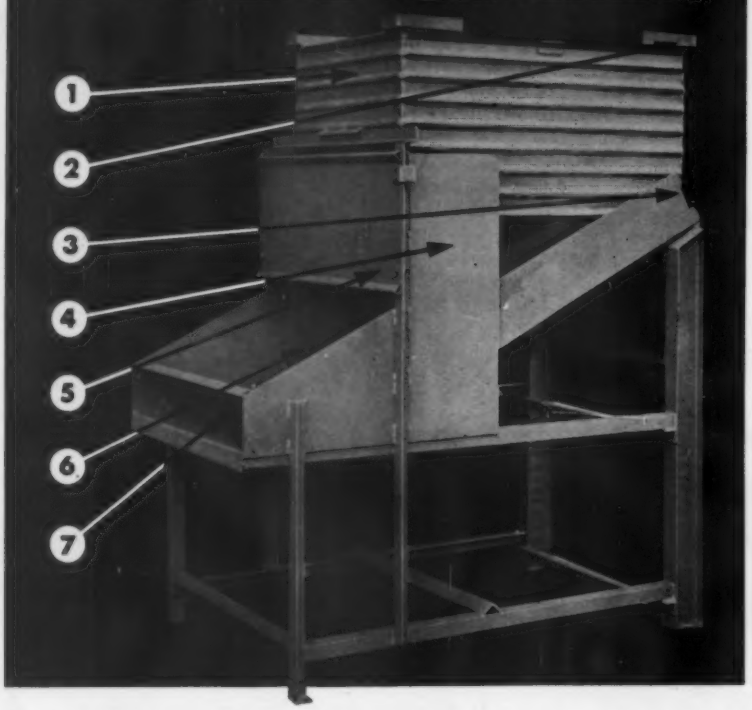
CHRYSLER AIRTEMP

FIRST WITH THE FINEST IN AIR CONDITIONING

For more facts circle 624 on Reply Card

Work-O-Matic* Box and Stand for

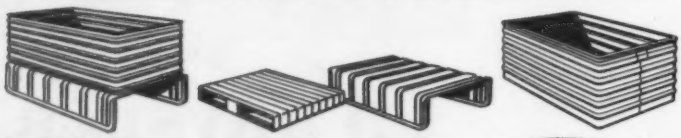
UNIT LOAD HANDLING AND WORK-LEVEL POSITIONING



Check these 7 Work-O-Matic features

1. **WORK-O-MATIC DROP BOTTOM BOX.** Heavy gauge corrugated steel construction. Square corners.
2. **CORNER STACKING ANGLES.** Safe tiering without shifting. Saves floor space.
3. **HINGED CHUTE BOTTOM.** As forks of truck are lowered, hinged bottom opens and parts slide into tray.
4. **WORK POSITIONING STAND.** Receives box from back or sides. Safely and easily transported by lift truck.
5. **CONTROL GATE.** Vertical adjustment controls flow of parts into tray.
6. **WORK-LEVEL TRAY.** Reservoir feature eliminates work stoppage when changing boxes.
7. **INCLINED TRAY END.** Assures parts accessibility. Speeds job changes.

In addition, Union Metal offers industry's broadest line of conventional type material handling containers. Write for complete catalog information. Address The Union Metal Manufacturing Company, Canton 5, Ohio.



*Registered Trade Mark

UNION METAL
Material Handling Equipment

See our live demonstration at the **M.H.I. SHOW** CLEVELAND June 9—12

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 178)

er. The arm is adjustable through 360 deg, from 1 to 3½ in. Contact arrangement consists of two single-pole, double-throw replaceable switching units. The roller arm is moved clockwise to actuate one unit and counterclockwise to actuate the other. Data Sheet 156 gives details on this switch. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

61—PIPE JOINT SEALER of tape-form Teflon

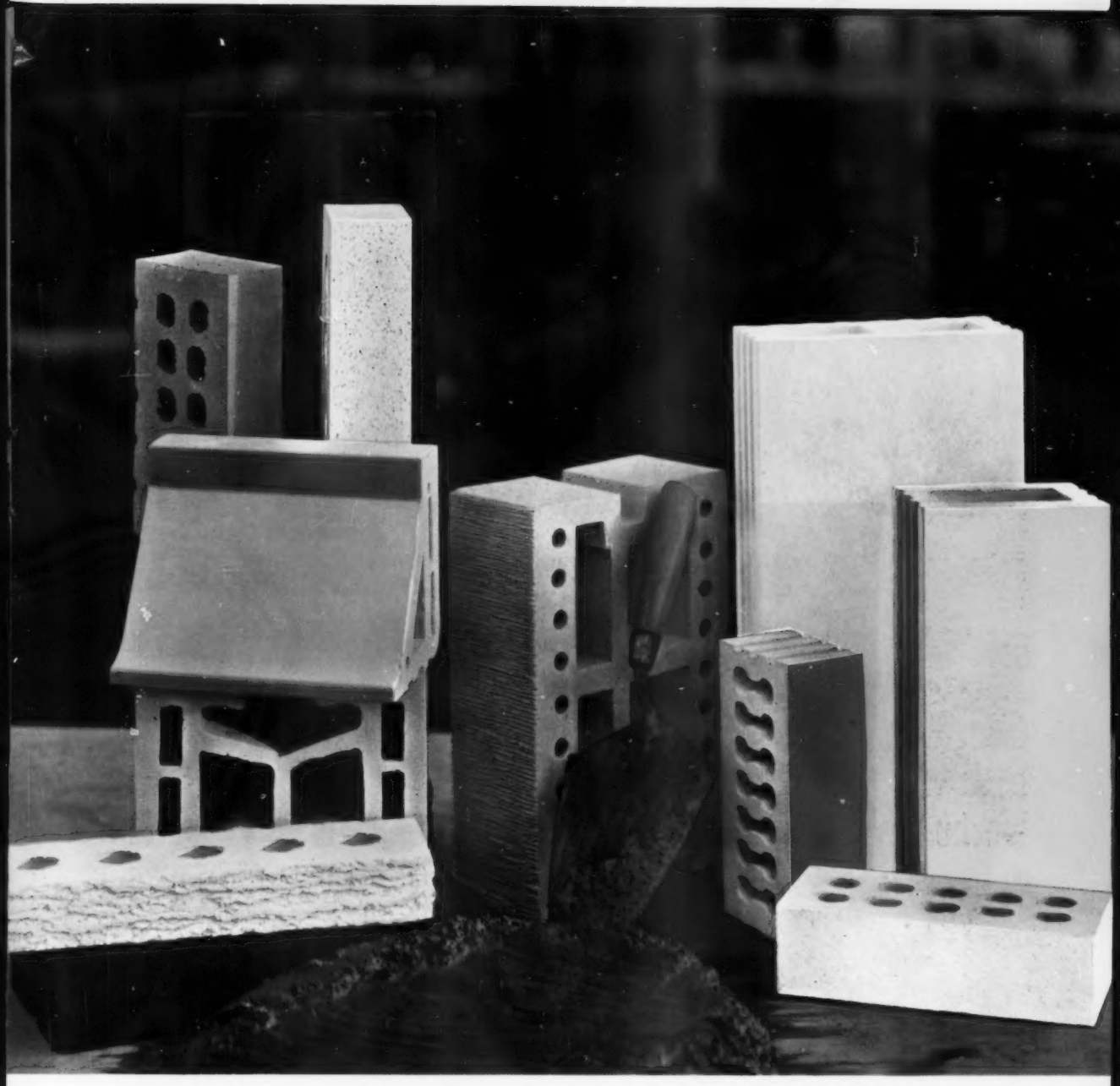
Thred-Tape seals all types of threaded connections under difficult service conditions, it is claimed, and will safely handle most industrial acids, corrosives, caustics, hydraulic fluids and aromatic fuels. It is also suggested for alkalis, toxics, biological and gas service. Temperature range is given as

—250 to 500 F, pressures to thousands of pounds. Thred-Tape can be used on plastic, aluminum, stainless steel, ceramic, synthetic rubber and carbon pipe. It prevents seizing and galling, is self-lubricating and lets connections be drawn up tighter, company says, and it never hardens. The sealer comes in ½-by-288 in. rolls and is applied by wrapping tightly around the male threads. When the connection is made, the tape fills in the voids. Crane Packing Co.

62—MOTOR for the short-coupled turbine pumps

Unibase, a vertical solid shaft pump motor for industrial short-coupled turbine pumps, combines an electric motor, high base and adjustable coupling into one unit. Because the one-piece cast base is an integral part of the motor, alignment and concentricity of motor shaft to coupling is assured, manufacturer states, and there is no vibration. The base has a large side opening for access to the adjustable coupling. Unibase utilizes an angular contact thrust bearing claimed more than adequate for the intermediate thrust range of short-coupled applications. This motor package incorporates an adjustable coupling, Micro-

For more facts circle 626 on Reply Card →

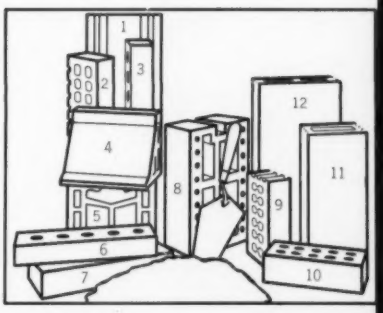


TODAY'S IDEA BECOMES TOMORROW'S SHOWPLACE

. . . when Natco structural clay products are in the picture

The photo above shows only a portion of the *complete* line of modern, colorful structural clay products manufactured by Natco . . . products designed for use in tomorrow's buildings. Shown are (1) Tex Dri-Wall tile, (2) Standard face brick, (3) Norman face brick, (4) Ceramic glaze Splayed Base, (5) Dri-Speedwall tile, (6) Wave-Tex roman face brick, (7) "SCR" brick, (8) Uniwall facing tile, (9) Ceramic glaze Vitribrik, (10) Ceramic glaze velour face brick, (11) "6T" Ceramic glaze Vitritile, and (12) "8W" Ceramic glaze Vitritile.

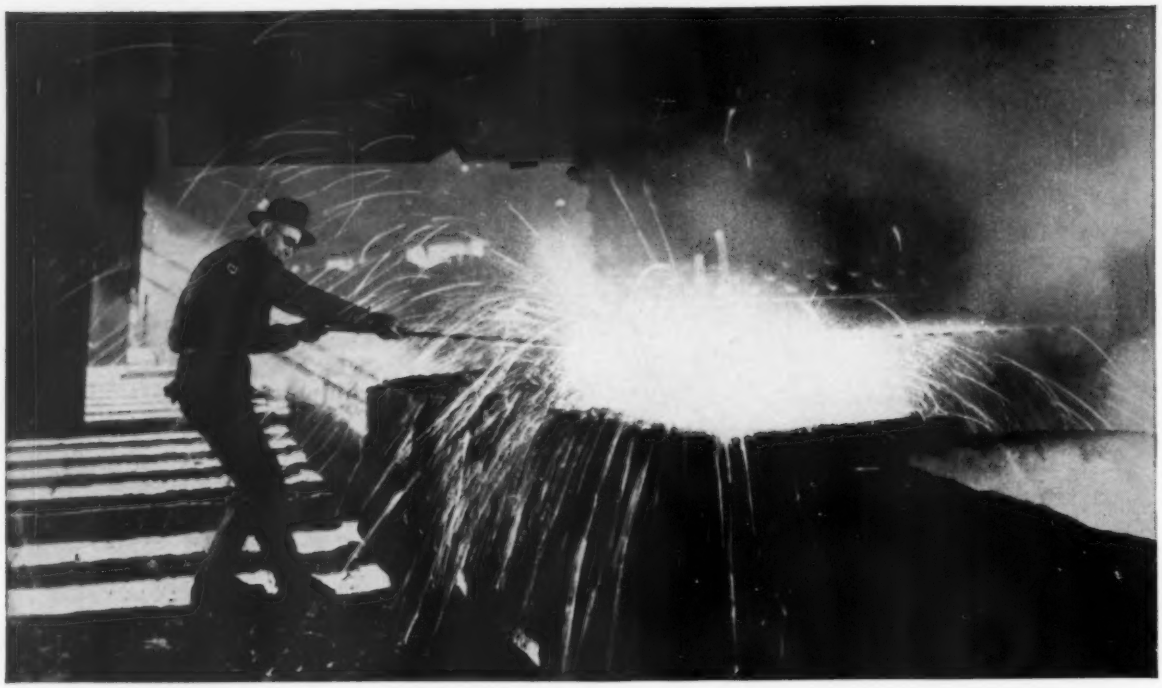
Write for one of our new, colorfully illustrated "full line" catalogs.



for the modern line of structural clay products look to natco corporation

GENERAL OFFICES: 327 Fifth Avenue, Pittsburgh 22, Pennsylvania . . . BRANCH OFFICES: Boston • Chicago • Detroit • Houston • New York • Philadelphia • Pittsburgh • Syracuse • Birmingham, Alabama • Brazil, Indiana . . . IN CANADA: Natco Clay Products Limited, Toronto

THE U.S. TREASURY SALUTES THE PEOPLE IN THE STEEL INDUSTRY



—who buy Savings Bonds and strengthen America's Peace Power

Men and women who earn their living in the steel industry can take great pride in knowing that their crafts and skills contribute, through raw material supplies, to nearly every other great industry in the United States. They can also be proud of the help thousands upon thousands of them are giving to America's Peace Power through the purchase of U.S. Savings Bonds.

Through regular purchase of Shares in America, these thrift-conscious people are reinforcing their own security after retirement, and establishing current reserves for such worthwhile family projects as new homes, education and travel.

If your company has not put in a Payroll Savings Plan thus far, you can start immediately. Just telephone your State Savings Bonds Director and accept the help he wants to give you. Or write to Savings Bonds Division, U.S. Treasury Department, Washington, D.C.

J. K. Thomson is shown here at his work in one of the great steel mills of this country. Like thousands of his fellow craftsmen, Mr. Thomson is making regular use of his company Payroll Savings Plan to contribute to the Peace Power of his country.

PLANT ENGINEERING

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

NEW PRODUCTS

(Begins on page 178)

set, designed to permit fine pump impeller adjustment—as close as 1/6 of a thread width—without disassembly of motor or coupling. Also provided is an optional coupling spacer to permit replacement of pump seals without removing motor. Unibase is available from 7½ to 125 hp on frames 254 to 445. U. S. Electrical Motors Inc.

63—GLASS FIBER PANELS are strong, resist weather

Superior weather resistance, improved color stability and increased load and flexural strength are features claimed for Superglazed Panels. Superglaze is a formulation developed to prevent panel erosion and to give long-time beauty. It is explained that by providing an improved bond between resin and glass fiber bundles, Superglazed Panels excel in weather resistance. Alsynite Co. of America.

Use the Reader Service Cards provided on page 263-264 to ask for more information on the products. Circle item numbers of products in which you are interested.

64—FLUORESCENT LAMP 40 w, rated 3100 lumens

Premium 3 is a redesigned fluorescent lamp described as the most powerful, economical and adaptable of its type. Rated at 3100 lumens, Premium 3 is said to provide the lowest overall cost of light of any 40-w lamp. It delivers 77.5 lumens per watt, with a rated life of 7500 hr on rapid start circuits; more than 5000 hr on preheat ballasts with FS 400 starters. According to manufacturer, it gives 11 to 17 per cent more light than any other 40-w lamp.

Three innovations in fluorescent lamp design are announced for Premium 3. First, more efficient and extra-uniform phosphor is compounded of closely controlled particle sizes for maximum brightness. Second, anodes have been added to the regular cathode electrodes, and these work more efficiently to get electrical energy out of the cathode wires into the gas in the tube. Finally, a new current carrying gas mixture increases the lamp's light producing efficiency.

Premium 3 Lamps are expected to find wide use in improving existing lighting installations at virtually no

Remington Stud Driver

The basic Power Unit...

Here's the single basic tool that gives you a new degree of on-the-job fastening versatility. Only *one* basic unit to buy—the Remington Model 455A—for all your fastening applications. Just choose the instantly interchangeable fastening attachment you need to do the job!

Plus choice of 4 fastening attachments...

K-1 1/4" & 3/8" Light Duty Captive Stud Attachment uses 22 cal. Power Loads. Use where extra safety is needed.

K-2 1/4" Light-Duty Attachment uses 22 cal. Power Loads. Handles 80% of your fastening jobs.

K-3 3/8" Medium-Duty Attachment drives heavy-duty studs with inexpensive 22 cal. Power Loads.

K-4 3/8" Medium and Heavy-Duty Attachment. Uses both 22 and 32 cal. Power Loads. For toughest jobs.

offers greatest single-tool fastening versatility!

The Remington Stud Driver offers these exclusive features:

- Four fastening attachments for light, medium, heavy-duty work, including the special Captive Stud Attachment for extra-safe fastening. No other single tool can cover such a variety of applications.
- Medium-duty fastening—requiring ⅜" studs—can be done with low-cost 22 caliber Power Loads.
- Positive one or two-hand operation at operator's option . . . no buttons or release to hold while fastening.
- Greater variety of applications made possible with instantly interchangeable guards. These 4" square, hollow "safety guards" fit snugly over work, trap spall and dust. More than 40 types are available.

Send coupon for free booklet about the Remington Stud Driver—your best buy in powder-actuated fastening tools!

CHOOSE THE POWER MOST EFFICIENT FOR YOU. REMINGTON POWER TOOLS ARE AVAILABLE IN **AIR • ELECTRIC • GASOLINE AND POWDER-ACTUATED MODELS**

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*Company*_____
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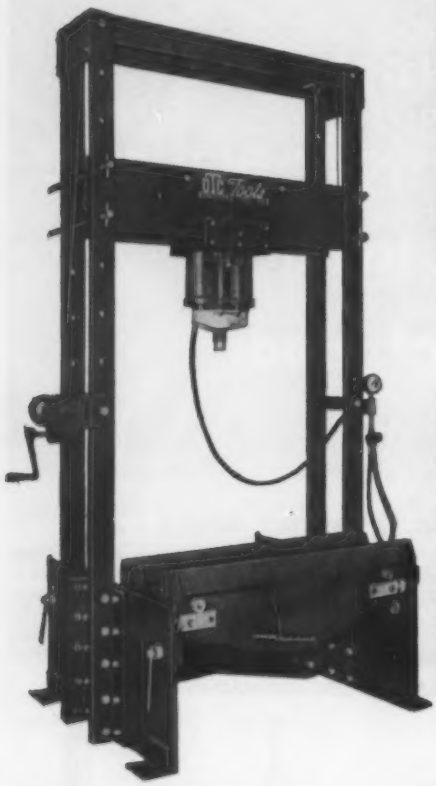
*City*_____ *Zone*___ *State*_____

For more facts circle 627 on Reply Card

Unique OTC Roll-Bed Hydraulic Shop Press Positions Work Quickly, Easily:



Bed is rolled *outside* the press frame to receive the unload hard-to-handle work.

One man easily rolls the bed and the work into position under the hydraulic ram.

Ideal for hard-to-handle work, the unique OTC *Roll-Bed* Hydraulic Shop Forcing Press permits overhead crane loading to bed which is outside the press frame — then work is rolled smoothly under the hydraulic ram. Unloading is just as easy. Rugged design of base, smoothly running rollers eliminates back breaking, dangerous loading, saves time. Cross head is adjusted to any height with winch — tapered pins lock it securely — trolley allows horizontal adjustment of ram for off-center work. Open sides admit long bars for straightening or bending. In 50 and 100 ton capacities, 8 ft. and 10 ft. high respectively, powered by manual or electric pumps. Other OTC Shop presses from 17½ to 50 ton capacities. See Sweets Plant Engineering File 2j.
Ow

Detachable Hydraulic Ram and Pump

Power-Twin Center-Hole rams and pumps on all OTC Shop Presses are detachable for use with OTC pullers for other maintenance work.

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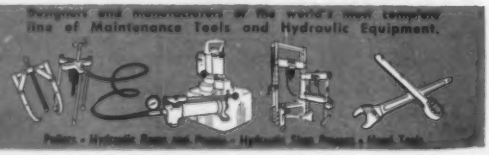
RESEARCH · ENGINEERING · DEVELOPMENT · OTC

Designers and manufacturers of the world's most complete line of Maintenance Tools and Hydraulic Equipment.



Pullers - Hydraulic Rams and Pumps - Hydraulic Shop Presses - Hand Tools

For more facts circle 628 on Reply Card

NEW PRODUCTS

(Begins on page 178)

added cost. It is stated that to get the same increase in light level with former fluorescents in a 10,000 sq-ft plant would require an initial investment of some $1900, plus an increased annual operating cost of $240. Premium 3 comes in standard cool white color, lists at around $1.50. General Electric Co.

65—WELDING TORCH is less than 7 in. long

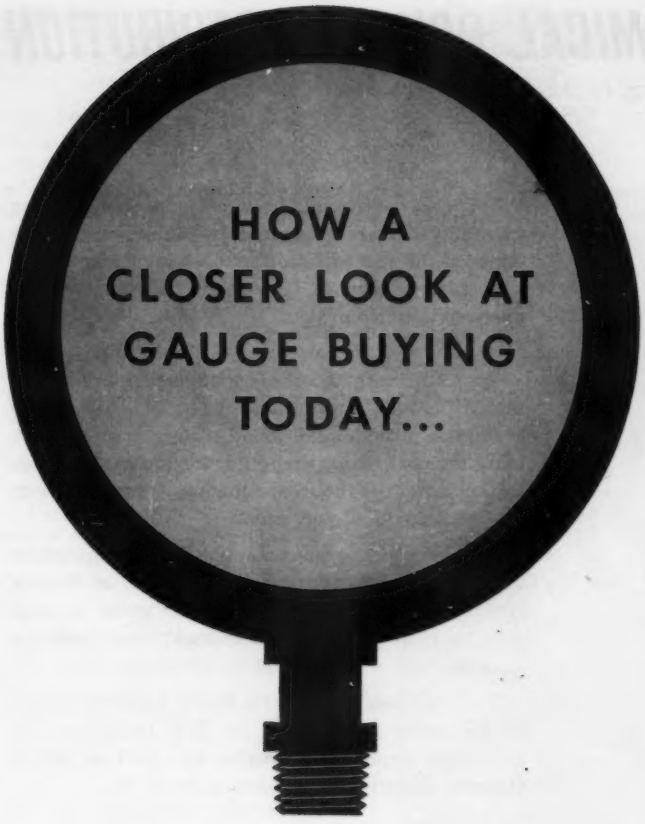
Small enough to weld inside a 3-in. tube, yet powerful enough to carry 200 amp on continuous duty cycles, the HW-20 is designed for manual inert-gas tungsten-arc welding. Operating at currents up to 225 amp on

reduced duty cycles, the torch weighs 3.6 oz, is 6⅞ in. long, and is equipped with small, flexible service lines said to make the torch as easy to use as a pencil. Other features cited include leak-proof water cooling system, rugged construction, efficient shielding to save gas, high-frequency safety, and easy maintenance. An argon gas shutoff valve for mounting on torch handle is available. Linde Co., Div., Union Carbide Corp.

66—CONVEYORS offer improved container handling

Identifying feature of the pressure-sensing A-P-C Conveyor is adjustable pressure control. It performs functions of accumulation and transportation. Each A-P-C unit is basically a wheel conveyor with a 4-in. rubber belt which provides power and replaces the usual center load-bearing wheels. A-P-C (or adjustable pressure control) describes the conveyor's ability to be tailored to meet weight, size and other handling requirements of a given container. This involves adjusting the spring-loaded pressure wheel on the conveyor for varying loads. Speeds range from 65 through 100 fpm—65 fpm is standard.

In accumulation, pressure sensing comes from a system of trigger wheels linked with pressure wheels. A line of containers can be stopped at any point by finger pressure without shut-



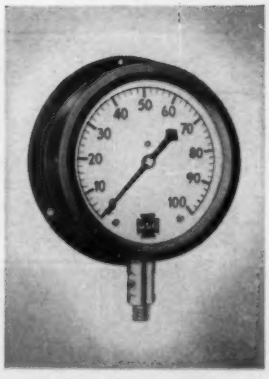
can give you a tighter grip on gauge costs!

Been looking at gauge buying in your plant as "routine"? In terms of gauge performance you need, accuracy you get, price you pay . . . and how and where you buy? You can pick up real savings with a closer look at your gauge requirements . . . and at what United States Gauge offers. USG features the world's largest stock of indicating dial pressure gauges. Over 50,000 standards, plus specials, with all possible choices of sizes, case stylings, pressure ranges and case materials . . . up to and including the finest gauges of highest accuracy. One source meets 99% of your pressure gauge needs, with the exact gauge for the exact purpose at the right price. And one phone call to your USG distributor taps that source. See the Yellow Pages, or write for catalogs and name of your nearest USG distributor today.

UNITED STATES GAUGE

Division of American Machine and Metals, Inc., Sellersville, Pa.

Replacement costs too high? Volume - priced, precision - built USG drawn-case gauges are the money-savers for replacement of any A.S.A. Grade B gauge in your plant (accuracy of 2% guaranteed). These standbys are specified by more than 60% of original equipment manufacturers today. Proof of USG reliability and value! *Write for Catalog 64A.*



Paying a premium for quality design, reliability? Check the new USG A-Line, premium design at savings up to 40% of premium prices! Meets A.S.A. Grade A Standards, including accuracy of 1%. Wide range of cases, sizes, movements, pressures cuts *you* in on A-Line savings wherever you need dependable gauge performance. *Write for Catalog 305.*

Paying for performance you don't get? Look at the USG Supergauge® line. Built like a watch to A.S.A. specifications for Grade AA Test Gauges, these gauges pay for themselves in long-lived, dependable performance and lower maintenance costs. Accurate to 0.5% of scale range. Full selection of case styles, sizes and options. *Write for Catalog 1819.*

Losing out on highest accuracy? USG Test Gauges are the elite of the industry, equalling or exceeding A.S.A. Grade AA standards with accuracy as high as 0.2 of 1%! Styles, sizes and case materials for all types of laboratory and test uses. You can't buy higher quality and precision in a test gauge! Get your money's worth at USG. *Write for Catalog 400.*

For more facts circle 629 on Reply Card

FOR EFFICIENT, ECONOMICAL POWER DISTRIBUTION

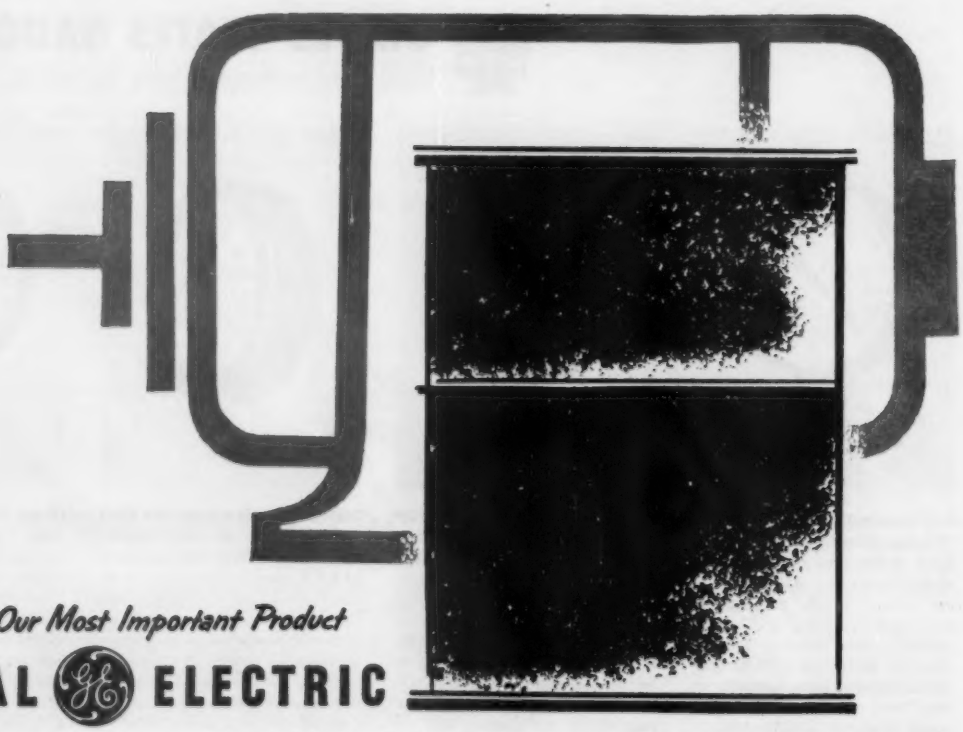
Use Capacitors With Motors

Why? Because capacitors supply the magnetizing current (kilovars) required by induction motors. This on-the-spot generation of kilovars can save you money because it reduces the current you must obtain from your utility and distribute in your plant.

Switched with motors, capacitors assure a regulated kilovar supply and free the distribution system to provide additional kilowatts. As a result, more motor, lighting and other loads may be added to the system without overloading transformers or other distribution equipment.

General Electric has a complete line of capacitors to serve the magnetizing requirements of motors. And now a new, easy-to-use selector guide is available to help you choose the right capacitors for your motors.

For your free copy of this handy capacitor guide, or for more information on G-E capacitors for industrial applications, write to: Section 446-6, General Electric Co., Schenectady, N. Y.



Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 630 on Reply Card

NEW PRODUCTS

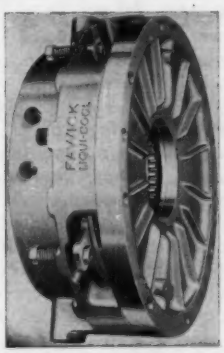
(Begins on page 178)

ting down the system, damaging containers, or buckling of the line, it is noted. Another advantage provided by the combined trigger and pressure wheel mechanism is a "singulating" action which occurs by spacing the containers when an accumulated load is put into motion again.

An A-P-C Conveyor for transportation has similar construction, except for the trigger wheels. Pressure wheels are spring loaded and always in contact with the belt. An advantage of this conveyor is that flow direction is reversible. Line pressure build-up is greater than with the accumulator type, it is explained, but since most of the load is supported by the side carrier wheels, it is less than with conventional conveying equipment. Rapids-Standard Co., Inc.

67—CLUTCHES, BRAKES are high capacity units

Heat dissipation rates up to 10 times greater than those of conventional water-cooled units are said to be achieved by Liqui-cool Clutches and Brakes. These disc-type power transmission or absorption units (developed in coordination with Raybestos-Manhattan, Inc., manufactured by Fawick Corp.) are designed to offer more torque capacity in a given size and lining life far exceeding usual performance levels. It is explained that



faster heat removal from friction surfaces through copper pressure plates provides greater energy absorption per square inch of lining area. According to manufacturer, the cool-running and high-capacity characteristics of Liqui-cool units suit them for severe applications where excessive frictional heat is developed—as in high inertia applications where large WR^2 loads must be started and stopped, and in constant tension braking and continuous slip clutching.

Liqui-cool Clutches and Brakes are

NOELTING
Faultless
Casters

L900
DOUBLE BALL BEARING SWIVEL
MEDIUM DUTY

CUT YOUR HANDLING COSTS 3 WAYS

Faultless Casters

SUPERIOR DESIGN FEATURES

1. CORRUGATED TOP PLATE . . . fully hardened to give added strength. Slotted mounting hole spacing permits easy attachment.
2. MAIN LOAD BEARING . . . consists of 21 hardened, polished balls (⅜" dia.) rolling in large dia. hardened, lubricated raceway permanently attached to caster horn to assure perfect alignment.
3. LOWER THRUST BEARING . . . contains 10 hardened steel balls (⅝" dia.). Hardened raceway is machined from bar stock. Ball retainer is hardened formed steel.
4. EXTRA-LARGE DIAMETER KINGPIN . . . assures bonus strength in this caster.
5. CLOSE FITTING, FORMED STEEL CUP . . . protects thrust bearing from foreign matter. Holds lubricants in bearings, keeps floor clean.
6. HEAVY GAUGE, FORMED STEEL HORN . . . easily absorbs highest rated loads and thrust.
7. FULL SELECTION OF WHEELS . . . for all types of floors and operating conditions. Bolt and nut axles permit quick wheel replacement when needed.

SERIES L9700 RIGID PLATE CASTER
Wheel types and sizes, load capacities and overall heights to match L900 Swivel Plate Caster.

ASK YOUR DISTRIBUTOR! Your Faultless Industrial Distributor will be glad to serve as your expert on casters and wheels. He stocks Faultless Casters and is prepared to offer "plus value" by recommending the right type, load capacity and wheels to suit your requirements. He is listed in your phone directory under "Casters."

FREE! SEND FOR ILLUSTRATED LITERATURE

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For more facts circle 631 on Reply Card

Constant Suction! Complete Collection!

SLY DYNACLONE®

The Dust Filter for Continuous Processes

Just turn this dust filter on and forget it. The Dynaclone operates continuously, 24 hours a day. It maintains constant, uniform suction at dust sources, reclaims all the dust to prevent air pollution and damage to plant equipment.

The Dynaclone has *new* "Resist-O-Wear" filter bags (patent pending) that give as much as three times longer bag life . . .

It has a new roller cleaner for simplified automatic self-cleaning. Resilient rubber rolls form a positive dust seal as each row of bags is cleaned by atmospheric air drawn in by the main operating fan.

And it contains more cloth per cubic foot of filter than any other make . . . greater filtering capacity with smaller space requirements.

Learn the many reasons why the Dynaclone represents a new high in dust filter efficiency . . .

Send for 36-Page Catalog 104

SINCE 1875 SLY

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4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

For more facts circle 632 on Reply Card

NEW PRODUCTS

(Begins on page 178)

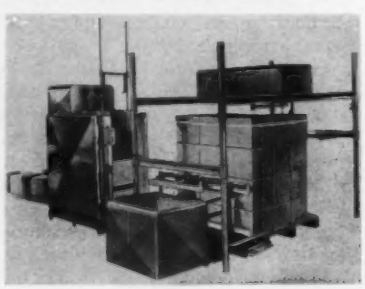
produced in five basic sizes in single and dual disc designs. Torque ratings for the former range from 4500 to 100,000 in.-lb. Dual disc units provide twice the capacity (9000 to 200,000 in.-lb) with same diameter and mounting dimensions. Disc sizes are 7¾ to 24 in. The internal gear drive features a straight-through bore for ¾- to 10-in. diam shafts. Fawick Airflex Div., Fawick Corp.

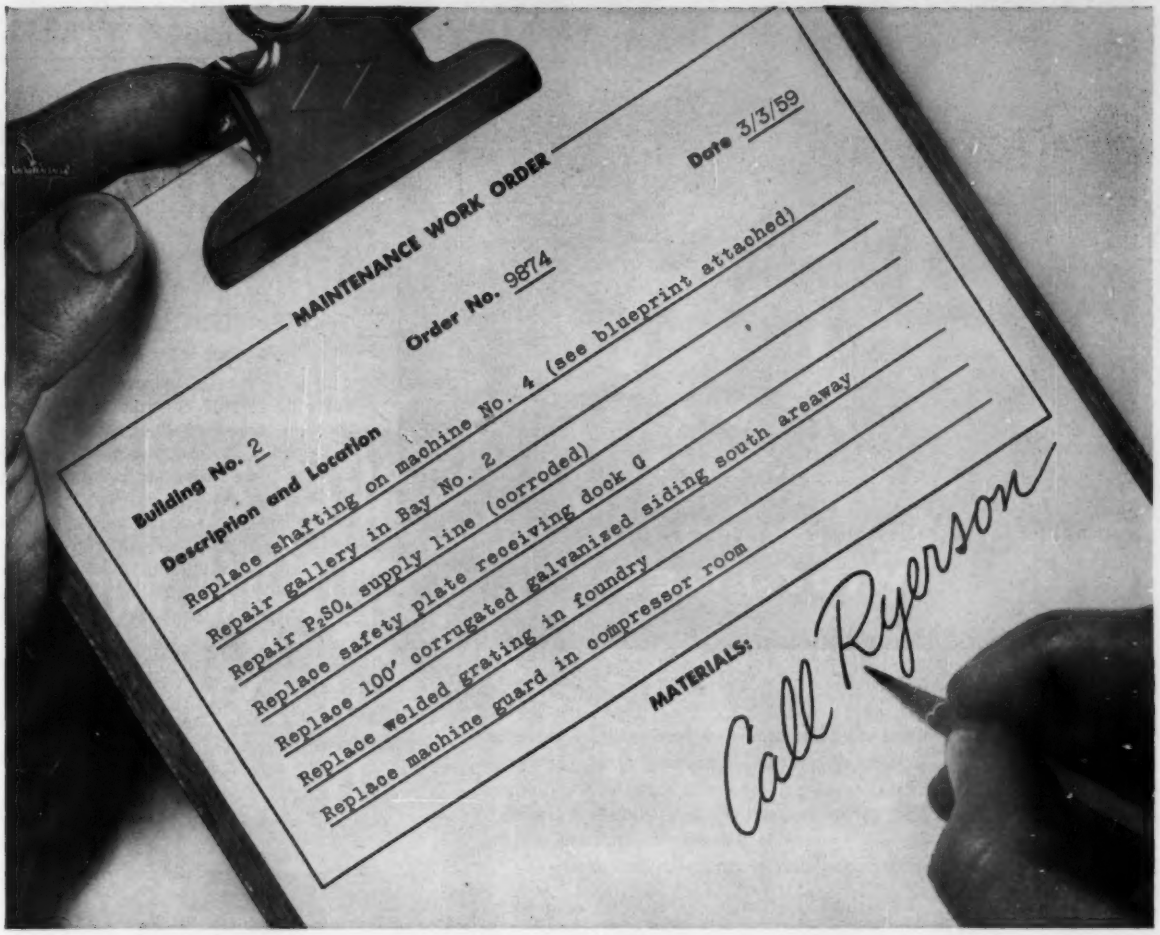
68—LINK CHAIN HOISTS in ⅛- to 2-ton capacities

Increased versatility with lightweight electric hoisting equipment is offered with the introduction of a link chain model of this company's Midget King Hoist. It lifts through alloy type link chain which flexes in any plane to allow picking up material not directly under the hoist itself. Like the roller chain models, these hoists come in five capacities from ⅛ to 2 ton. A common suspension frame fits similar capacity hoists of both types. Manufacturer says the link chain hoist is compact and lightweight, can be operated for less than two cents a day. Yale Materials Handling Div., The Yale & Towne Mfg. Co.

69—PALLET LOADER is low cost, automatic

Simplified in design and costing about half the price of many pallet loading machines, the L-P Automatic Pallet Loader consists of three synchronized, separately powered units—stacker, pusher and taper—and a conveyor to connect with existing production lines. It is suggested for use in all industries using cases, cartons, kegs and other containers. Components, each powered by an fhp motor, handle most container sizes, or can be engineered to fit special applications. No operator is required. The loader occupies minimum floor space—less than 80 sq ft—and since it can be placed on top of the floor, it requires no pit. It performs straight back, corner-to-corner




MAINTENANCE WORK ORDER
Date 3/3/59
Order No. 9874
Building No. 2
Description and Location
Replace shafting on machine No. 4 (see blueprint attached)
Repair gallery in Bay No. 2
Repair H_2SO_4 supply line (corroded)
Replace safety plate receiving dock G
Replace 100' corrugated galvanized siding south areaway
Replace welded grating in foundry
Replace machine guard in compressor room
MATERIALS:
Call Ryerson

...for all maintenance steel needs

Cold Finished Shafting—Ryerson stocks of t g & p bars provide a ready source for shafting of outstanding size accuracy, straightness and concentricity.

Expanded Metal—Ryex® expanded metal—light, strong, rigid . . . easy to handle—all sharp edges removed. Two types: standard and flattened.

Stainless Pipe and Tubing—on hand in a complete range of types. Valves plus welding and screwed-type fittings also available.

Galvanized Sheets—a wide range of gauges and sizes. Controlled galvanized process provides tight coat of spelter. Sheets stand forming without cracking. Cut or corrugated to your order.

Safety Plate—Inland 4-Way® Safety Plate in two pattern sizes for flooring, stairs, ramps, platforms. Provides plenty of traction. Easy to install, maintain.

Welded Grating—stock-size panels, or tailor-made for your job with all necessary cutouts and banding. Furnished galvanized or painted.

Perforated Sheets—standard patterns in stock; special patterns perforated to order. Available in carbon steel and stainless sheets or plates.

Let Ryerson carry your inventory

These and all other maintenance steels cut to your most exacting specifications—are available from the world's largest stocks at Ryerson. Save time, money, space . . . help your maintenance crew finish faster and have more time for preventive maintenance. Call Ryerson.

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NATION'S MOST COMPLETE SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

For more facts circle 633 on Reply Card

Around-the-clock operations at the Champion Paper and Fibre Company's sprawling Pasadena, Texas, plant called for illumination of a million square feet of wood storage area. And just thirty-two 1,000-watt Wide-Lite area lights were required to provide the answer – uniform coverage without distracting glare or dangerous dark areas.

Designed especially to enhance the unique characteristics of color-corrected mercury vapor lamps, Wide-Lites bring *new dimension* to area lighting. They produce broad patterns which provide smooth, even coverage without hot spots or dark shadows. The patterns may be accurately plotted to determine the exact number of units needed to provide any desired level of illumination.

Ruggedly constructed from cast aluminum alloy, Wide-Lites are finished in aluminum epoxy paint for corrosion control. Outdoor models are sealed with tempered glass lens, and re-lamping is accomplished without disturbing the seal of the lens. Exclusive built-in heat radiating fins limit lamp temperatures to the most efficient range. A choice of reflectors is available on all models, and sizes range from 100 watt to 1000 watt.

To assist you in planning efficient working coverage of outdoor working areas, Wide-Lite engineers have prepared a unique group of transparent plotting curves. Write today for your set!

WIDE-LITE.

manufactured by
WIDE-LITE CORPORATION
P. O. Box 191 • Houston 1, Texas
In Canada: Wide-Lite Division of Wakefield Lighted Limited London, Canada

OUTDOOR AREA LIGHTS • INDOOR LUMINAIRES • SPORTS LIGHTS • PROTECTIVE LIGHTS

For more facts circle 634 on Reply Card

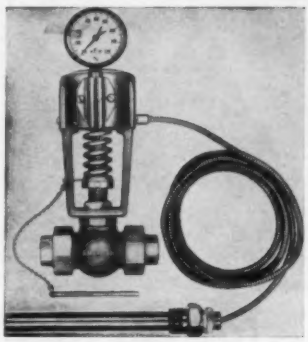
NEW PRODUCTS

(Begins on page 178)

stacking and is designed to handle up to 15 units a minute—with an extra stacker, 30 units a minute. A feature of this loader is the taper, which applies a strip of pressure sensitive tape to the top layer of units loaded on the pallet for load stability. The Lathrop Paulson Co.

70—TEMPERATURE UNIT, has close corrective action

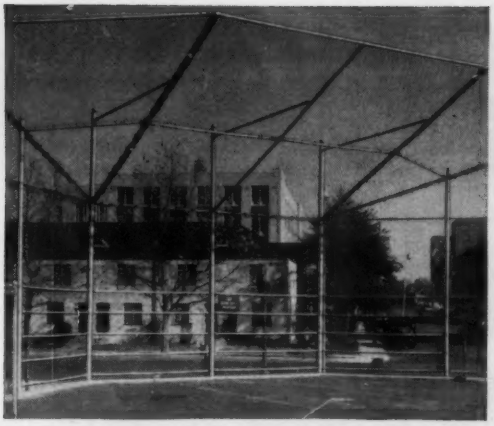
The self-operated American Temperature Regulator controls temperature through the throttling action of its valve on a steam or water line. It is designed to respond instantly and powerfully to temperature change. Corrective strole begins with less than 1/10 deg change in temperature at the bulb, says manufacturer; temperatures stay within the narrowest possible throttling band and steam waste



is eliminated. There is claimed to be virtually no maintenance or servicing necessary on this regulator. The packless valve requires no lubrication, an internal safety spring protects against damage from accidental overheating; and stainless steel seats and discs are designed with disc guides outside the path of steam flow to eliminate wire drawing. Both an indicating model, with adjustable dial thermometer, and a non-indicating model come in sizes from ½ to 2 in. Ranges are from —15 to 50 F to 240 to 350 F. Bronze, stainless steel and plastic coated systems are available. Manning, Maxwell & Moore, Inc.

71—COMPOUNDS protect against oxidation agents

Coroshield products are announced as a team of chemical compounds exhibiting superior anti-corrosion and surface sealing properties. Available in several formulas they are said to bind themselves to every kind of surface to form tenacious, inorganic, impervious micro-thin films that are fire

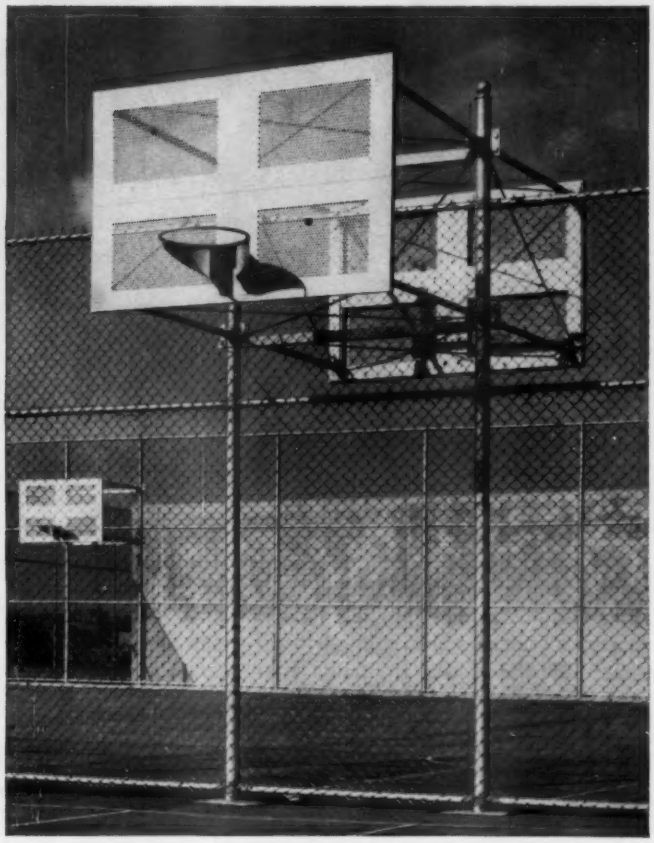


RESULTS GAINED FROM ALUMINUM:

appearance?
EXCELLENT!

strength?
UNIMPAIRED!

upkeep cost?
NOTHING!



Chain Link Fencing of Alcoa Aluminum Defies Deterioration

All-aluminum chain link fencing for community facilities such as parks, schools and athletic fields stretches the taxpayer's dollar while fully meeting all security requirements. Chain link fencing of Alcoa® Aluminum lasts indefinitely and will save the rising cost of periodic maintenance.

Alcoa Aluminum alloys are highly corrosion resistant and provide extra strength to defy abuse and absorb impact. Lightweight aluminum is easily relocated; reclaimed sections blend in with the new. Chain link fencing of Alcoa Aluminum erected over 30 years ago still stands today, unimpaired in strength or appearance.

Check these other advantages you get with Alcoa Aluminum:

High Strength—Average tensile strength of Alcoa's new alloy is 57,500 psi.

Easy Erection—Light weight means less labor.

Readily Available—Reliable manufacturers and erectors in 48 states. Contact your nearest Alcoa sales office.

For your copy of 12-page illustrated booklet and a summary of recently bid prices on 4-ft-high and 6-ft-high all-aluminum fencing, write to Aluminum Company of America, 2057-F Alcoa Building, Pittsburgh 19 Pa.

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV

For more facts circle 635 on Reply Card

Mixing something? If it's a fluid, there's no faster, surer way to mix it than with a LIGHTNIN Mixer.

The unit shown gives the batch a powerful tumbling-rotating motion to create uniformity in shortest possible time and hold it indefinitely. This is one of 30 standard portable models. You can get permanently mounted types, too, for mixing any fluids in any container up to and including a six-million-gallon tank.

You never have to worry about results when you mix with a LIGHTNIN Mixer. It is guaranteed, unconditionally, to do the job. It requires very little servicing (hundreds have been running for 20 years and more). It is built of standard interchangeable components, so replacement parts are always in stock.

For quick, competent help on fluid mixing of any kind, call in your LIGHTNIN Mixer representative. His name is in Thomas' Register. Or write us direct.

One of 30 standard LIGHTNIN Portable Mixers available in sizes from ⅙ to 3 hp.

Send catalog information on:

- ☐ Portable mixers
- ☐ Top-entering mixers
- ☐ Side-entering mixers
- ☐ All types

"Lightnin" Mixers

MIXCO fluid mixing specialists

Check, clip, and mail with your name, title, company address to:

MIXING EQUIPMENT Co., Inc., 144-f Mt. Read Blvd., Rochester 3, N. Y.
In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ont.

For more facts circle 636 on Reply Card

NEW PRODUCTS

(Begins on page 178)

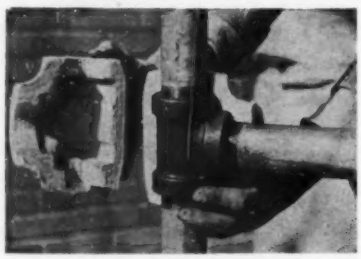
resistant and defy chipping, peeling, flaking and abrasion—and protect against oxidation agents of every degree including hydrochloric, nitric and sulfuric acids. They come in liquid form and are applied by spraying, brushing, dipping, filling, rolling. Coroshield films are claimed to withstand a permanent load of 12 atmospheres and a constant temperature of 400 F, an abrupt increase to 1100 F.

Of the seven formulas, Integrat is described as a universal sealer for protecting almost any surface. Interlex is for use in shipbuilding industries to protect against salt water, mineral corrosion and fouling. Portalit is for strengthening and sealing masonry. Portaplex is for use in construction, to fill, seal and strengthen. Terralin is for use in and on underground pipes. Metalspachtel is for use as a filler with any bearing material. Korroplast is for use over any corroded area hard to reach or impossible to clean. The Coroshield Co., Ltd.

It's easy to obtain product data with the postage-free Reader Service Card provided on pages 263-264. Use them for information on advertising products, too. Just circle the key number appearing at bottom of the ad.

72—FITTING INSULATORS slip on easily, look neat

Of molded Fiberglas, I-C Insul-Sure Insulators are said to offer ease of installation, insulating efficiency, neat appearance, immunity to rust, rot and corrosion. They are also claimed to result in net cost savings, compared to conventional methods. To install, you simply place the two halves of the insulator over pipe fitting and then staple, wire or tape the sections together. The insulators are not affected by moisture, it is noted, and are suitable for operating temperatures to



An Expensive, Unscheduled Coffee Break

CAUSED BY MOTOR BURNOUTS

Could have been prevented with

KLIXON

3-PHASE MOTOR PROTECTORS

KLIXON-Protected Motors are a sure, inexpensive way to insure steady production. By preventing motor failures, KLIXON Motor Protectors decrease costly delays and expensive motor replacements.

Built in by the motor manufacturer, they safeguard your motors and prevent overheating and burnouts caused by the following conditions —

Prolonged overloads, unbalanced voltage, stalling, failure to start, increased ambient temperatures, lack of ventilation, plugging or reversing duty, and single phasing.

The advantages to you are . . . safe maximum motor output under normal and adverse operating conditions . . . simplified motor controls . . . reduced motor repairs and replacement . . . reduced costly production down time due to motor burnouts.

KLIXON-Protected Motors are now available from your motor supplier. Specify and use motors with KLIXON Inherent Overheat Protectors. The savings offered more than offset the slight additional cost.

Write for your copy of Bulletin PR-1243. It explains the advantages of 3-phase motor protection.

METALS & CONTROLS

4506 FOREST STREET, ATTLEBORO, MASS., U.S.A.

A DIVISION OF TEXAS INSTRUMENTS INCORPORATED

SPENCER PRODUCTS: Klixon® Inherent Overheat Motor Protectors • Motor Starting Relays • Thermostats • Precision Switches • Circuit Breakers

For more facts circle 637 on Reply Card

NEW PRODUCTS

(Begins on page 178)

450 F. They are available in 1 in. thick for ½- to 8-in. screwed fittings, 2- to 8-in. welded fittings; or 1½ in. thick for ¾- to 8-in. screwed, 2- to 12-in. welded ones. Insul-Coustic Corp.

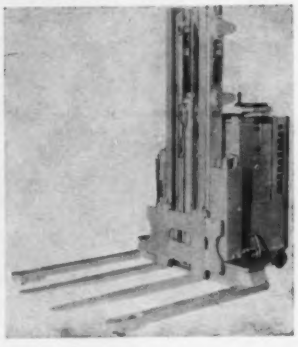
73—MOTOR CLEANER now comes in aerosol can

Vego H-18 Degreaser for the cleaning of motors and other electrical equipment is now available in an aerosol can, simplifying cleaning of small power and hand tools, exhaust fans and vents, contact points, etc. Availability of the degreaser in the aerosol can reduce waste and saves time in many cleaning operations. Chemicals and Materials Corp.

74—STRADDLE TRUCK is battery powered, rider type

For tiering palletized materials in confined areas, the Powrworker Rider Straddle Stacker is introduced in 2000- and 3000-lb capacities, at 24-in. load centers. Its turning radius is 62 in., and it has travel speeds to 4.6 mph without load, 4.2 mph with load, forward and reverse. It is designed to carry capacity loads through aisles as narrow as 42 in.; for right angle stacking this truck requires an aisle width of 71 in.

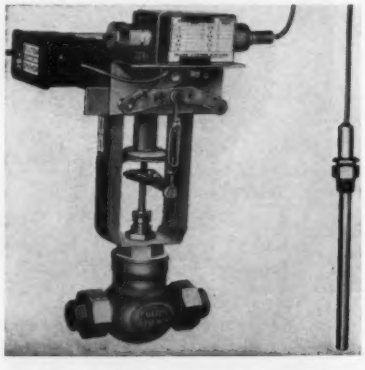
Operating controls are on both sides of the driver's platform. On the left the steering wheel controls turning, and on the right a hand throttle



controls acceleration and forward-reverse direction. A waist high lever controls fork lift and lower. Brake pedal is controlled by the left foot. For easy maintenance, the drive unit can be removed while the truck is in an upright position. Industrial Truck Div., Clark Equipment Co.

75—MODULATING UNIT controls process variables

An electrically operated modulating instrument, the Fultro-Lectric is a controller-positioner-valve combination for controlling process pressures or temperatures. It is a compact, package unit, said to enable a small plant to maintain precise control for-



merly possible only where a compressed air supply was available. A change in measured variable causes a switch assembly to actuate a shaded-pole, three-wire reversible motor, driving the valve in the proper direction. When the valve reaches the

GLOBE... SAFE•GARD
(FORMERLY HILMAR)
EXPANDED METAL PARTITIONS

with exclusive QUIK-ERECT patented fittings

...will answer all your enclosure problems...

Here is the new, easier, simpler method of guarding conveyors and machines and for all in-plant partitioning. Shipped READY for erection, no cutting, drilling or welding required . . . these interchangeable expanded metal panels provide greater safety, cut overall costs, cover a wider range of use and require 85% less storage space.

EXCLUSIVE QUIK-ERECT SECTION CLIPS save much of the erection time formerly required. Proven successful in hundreds of installations, these Safe•Gard panels are of welded construction, give longer life, are more rigid and stronger than wire, will not ravel or fray.

Note enlarged detail showing SAFE•GARD Quik-Erect Clips securely joining the interchangeable panels.

Write today for more details or call your Globe (Grip-Strut) Distributor. Distributors in all principal cities, listed under "Grating" in your phone book.

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40.. S. Princeton Ave., Chicago 9, Ill.

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There's only ONE

TARSET®

Coal Tar-Epoxy Resin Coating

IF you're confused by the number of coal tar-epoxy resin coatings on the market today, perhaps these few brief facts will clear the air:

1. Pitt Chem TARSET is the *first* patented coal tar-epoxy resin coating on the market.

2. No other coal tar-epoxy resin coating duplicates the exclusive TARSET formula. It has not been made available to anyone else.

3. Only TARSET coal tar-epoxy resin coating is backed by a *five year* record of outstanding performance in the field.

Do *you* have an unusual corrosion problem in the marine, chemical, petroleum, pulp and paper, water and sewage, or general plant maintenance field? Then you should know more about the revolutionary ability of TARSET to stop corrosion where most other practical methods fail. And to do it at relatively low cost. *Call your industrial distributor for more information . . . today!*

PITT CHEM Industrial Coatings are available through leading Industrial Distributors. See the "Yellow Pages."

★ PITT CHEM "Tarmastic"® Coal Tar Coatings
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★ PITT CHEM "Tarset" Coal Tar-Epoxy Coatings

W&W 7370

PROTECTIVE COATINGS • COAL CHEMICALS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON • FERROMANGANESE

For more facts circle 639 on Reply Card

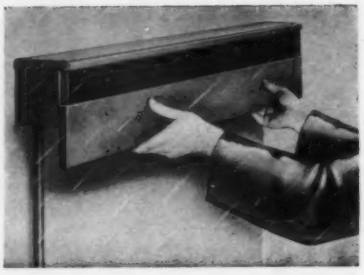
NEW PRODUCTS

(Begins on page 178)

position called for by a temperature sensing bulb, a feedback switch stops the motor. According to manufacturer, the unit's advantages include: small temperature sensing bulb with high rate of response; adjustable proportional band; easy installation, 1-in. stem travel; reproducible temperature settings, field reversibility and manual positioning of the valve. Fulton Sylphon Div., Robertshaw-Fulton Controls Co.

76—WIRING GUTTERS closed for weather protection

Designed primarily for outdoor installation, these rain-tight wiring gutters feature welded-on tops with deep overhanging flanges to prevent adverse elements from damaging the wiring. A sealing device helps prevent tampering and the slip-on removable front covers require fewer screws for easier installation and maintenance. Gutters come in standard 4-by-4 in. and 6-by-6 in. sizes in 1-ft through 6-ft lengths. Formed of galvanized sheet steel, all are furnished with combination knockouts on th bot-



toms, and all feature spot welded construction, are finished in gray enamel. Keystone Mfg. Co.

77—PENETRANT reaches the "unhandy" rusty areas

Whiting Rust Cutter is now available in a 16-oz aerosol can which makes it possible to shoot a pinpoint spray of the penetrant into confined, hard-to-reach areas. According to manufacturer, ingredients of this penetrant are the same as used in the regular liquid form, which is still supplied. Claronex Products, Inc.

78—FEEDER SYSTEM treats cooling tower water

Designed to provide continuous, automatic proportioning of liquid chemicals in the treatment of air conditioning cooling tower water, the Automatic Micro Feeder eliminates need for daily charging of chemicals. It supplies 1/10 to 1 gal of filtered liquid chemical into the circulating water every 2 hr. Manufacturer says that one or two 55-gal drums of chemical can last a season under normal conditions. According to company, this feeder is easy to install, and the control is easy to set and regulate. There is no valving to set and no moving parts. Operation is reported to cost only pennies a day.

Heart of the equipment is an aspirator type chemical feeder with a differential pressure regulator maintaining a constant pressure drop across a porous stone that acts as a rate valve. The chemical feeder is connected by plastic tubing to suction and discharge lines of the cooling tower water circulating pump. Differential pressure, averaging 20 to 40 lb, creates a vacuum in the reagent side of the unit that induces reagent flow from the supply drum into the container through the porous stone, through the differential pressure regulator and then into the main stream at the aspirator. Flow rate through the stone depends on depth of its immersion in the transparent bowl. A push button control lets air enter or escape and thus regulates reagent level in the bowl. The unit is sug-

THE ALL-NEW

P&S ROCKER-GLO SWITCH

PUSH IT

ROCK IT

ROLL IT

PRESS IT

...the switch that looks right, feels right and is right for every type of wiring job.

Here at last! After intensive testing, Pass & Seymour, Inc., proudly presents *ROCKER-GLO* ... the *one* switch that answers all your needs.

No matter how you choose to operate the new *ROCKER-GLO*, the merest brush of a finger produces instant action ... *and ROCKER-GLO glows in the dark!*

AVAILABLE in Despard interchangeable type, Despard type mounted on strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts A.C.

Send for brochure on Rocker-Glo Dept. PE-659

P&S

PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK
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In Canada: Renfrew Electric Limited, Renfrew, Ontario

MAKE THE COMPLETE JOB COMPLETELY P&S
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Steam trap dependability is a matter of what the manufacturer puts into the trap

ARMSTRONG TRAPS ARE DESIGNED AND MADE TO GIVE YOU DEPENDABILITY

1. Efficient, proved operating principle

Armstrong Traps provide the most advanced development of the time-proven inverted bucket principle. Simple, but effective, there isn't much that can go wrong.

2. Good design

Armstrong Trap design gives big capacity in a small package. The mechanism is virtually fool-proof. All body styles are easy to inspect and maintain without removal from the line.

3. Highest quality materials of construction

Only the best goes into Armstrong Traps. Bodies are close grained 30,000 tensile iron castings or high quality forgings. Working parts are all tough, corrosion resistant stainless steel.

4. Good workmanship

Armstrong Traps are made by craftsmen who take pride in their work. Careful inspection and frequent checking insure the quality of the trap.

5. Application know-how

Your problem has probably been solved already in the extensive experience of the Armstrong engineering and sales organization. You can be sure of sound, dependable recommendations.

Your local Armstrong Representative can show you what Armstrong dependability can do for you. Call him today or write direct.

860 Series for low pressure heating service.

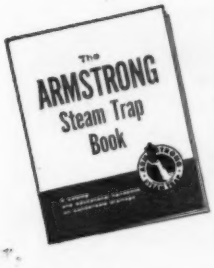
800 Series, side inlet, side outlet.

No. 801, side inlet, bottom outlet.

880 Series, integral strainer.

200 Series, bottom inlet, top outlet.

Forged Steel Series for high pressures, high temperatures.



The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS

9126 Maple Street Three Rivers, Michigan

For more facts circle 641 on Reply Card

NEW PRODUCTS

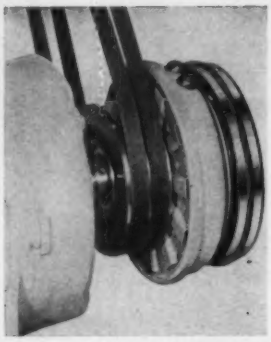
(Begins on page 178)

gested for cooling towers of 10 to 400 tons capacity in normal operation. The Bird Archer Co.

79—CLUTCH-SHEAVE fits standard NEMA motors

Electro-Sheave, a combined electric clutch and sheave assembly for direct installation on standard NEMA electric motor shafts, comes in five sizes of standard clutch units, 1 to 25 hp, for use on new or existing machinery. These drives permit taking advantage of electric no-load starting without engineering and machining usually required to adapt standard electric clutches to primary shafts, company states. Electro-Sheaves are designed to engage or release at any speed. For inching or jogging several starts are possible in less than one revolution of the clutch without what is considered normal wear and tear on motors, controls or machinery, it is noted; release is instantaneous and load braked without plugging motor.

Only a key and setscrew are required to install the unit in addition to making electrical connections to clutch and brushholder from control panel. Clutch, ballbearing sheave, and shaft extension sleeve all fit as a single

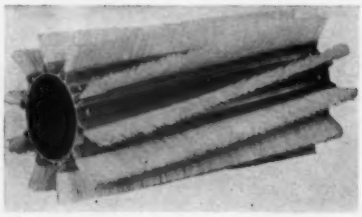


package onto standard NEMA motor shafts. Actuation of clutch field attracts and locks the armature, which picks up motor rotation and transmits it to the pulley. When the clutch is disengaged, the sheave runs on anti-friction bearings. There is no mechanical connection between motor shaft and sheave, so no torque is transmitted.

Because the motor runs continuously when used with the Electro-Sheave, inertia of motor and rotor and clutch magnet aids the motor. The breakdown torque of the motor is available for starting the load, permitting a smaller motor to be used in many applications, manufacturer points out. On installations ordinarily requiring frequent starting and stopping of the motor, elimination of high-motor starting currents permits use of smaller starters. And smaller clutches can often be used because they are applied to the motor shaft rather than to a secondary shaft. Warner Electric Brake & Clutch Co.

80—BRUSH cleans off conveyor carry-back

The Rota-Master is designed for cleaning carry-back from conveyors—material which adheres to the belt after unloading. Brushing action of the low cost Rota-Master is claimed to remove 80 to 100 per cent of the carry-back. This brush employs extruded



aluminum mounting and a new synthetic fill material, Korfil P, said to

Engineering PLUS...

Keeps Tank Interiors Corrosion Free at a Practical Cost

One of the five municipal tanks serving the City of Jacksonville, Fla. which has been cathodically protected by E.R.P. system since 1942.

The City of Jacksonville, Fla. has relied on engineering plus from Electro Rust-Proofing Corp. since 1942 to protect water storage tanks serving the city. Since installation of cathodic protection, tanks have been virtually corrosion free on the under water surfaces and maintenance costs have been reduced to a minimum.

E.R.P. engineering plus means cathodic protection systems
designed to meet your needs...
maintained to your benefit...
priced to your profit...

E.R.P. provides engineering plus to meet any corrosion problem of submerged or buried metals. For full information on cathodic protection for your water storage tanks, water treatment structures and pipelines, write for bulletin E-42.72.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CABLE: ELECTRO, NEWARK, N. J.

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For more facts circle 643 on Reply Card →

TEXACO ORGANIZED LUBRICATION CAN HELP YOU...

Get rid of the "guns" that "misfire"

His grease guns are aimed at your profits; they can help boost them—or eliminate them altogether. Here's why:

You used to need a different grease for nearly every job. That meant 20 or 30 lubricants in the plant, with the almost inevitable danger of misapplication — and damaged machinery.

Unless you're operating on the basis of a modern lubrication survey, *the chances are that this situation still exists in your plant!*

A Texaco Organized Lubrication Plan uses a minimum number of proper oils and greases—including newly developed multi-purpose lubricants—to reduce your inventory by as much as 80% and virtually eliminate this problem.

Get the details on Texaco Organized Lubrication. Contact your local Texaco Lubrication Engineer or write for "Management Practices that Control Costs via Organized Lubrication."

The Texas Company, 135 East 42nd Street, New York 17, N. Y., Dept. E-101.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

no slip...no slide...no skid ...with A.W. ALGRIP abrasive flooring

Be sure of safe footing at the hazardous places in your plant. You know where they are . . . wherever slipping, sliding and skidding occur. Now your slippery spots can be your safest spots . . . with A. W. ALGRIP flooring.

Here's a rolled steel floor plate that's made by an Alan Wood patented process in which an abrasive is embedded to a controlled depth . . . becoming an integral part of the steel plate, to give you lasting safety.

A. W. ALGRIP can be used as independent flooring . . . or as flooring overlay. Put your plant on a safe footing, with A. W. ALGRIP . . . Approved for Safety by Underwriters' Laboratories. Write for Bulletin ALN4

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • REPRESENTATIVES: Atlanta • Boston • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

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NEW PRODUCTS

(Begins on page 178)

have inherent qualities for fast cleaning action and longer wear. According to company, Korfil P does not absorb moisture, withstands temperature extremes and is not harmed by acid or alkaline carry-back. Three fill sizes are available: 0.040-in. Korfil P for heavy duty type operations encountered in coke plants, sintering plants etc.; 0.028 Korfil P, for application in the food industry; and 0.016 Korfil P for dusting operations and belts conveying fine materials. These units have three brush face sizes of 16-, 18- and 24 in. and can be combined to clean any belt size. The Osborn Mfg. Co.

81—EYE RINSE BOTTLE can be kept within reach

The pneumatic principle of the Advance Eye Bath Fountain is claimed to be as effective and safe as fountain equipment for use in rinsing for both

slight and severe chemical burns. These bottles are inexpensive and can be kept throughout the plant, where they are immediately accessible. They are described as easy to clean, unbreakable, and easy to use in any position—standing, sitting etc. Advance Glove Mfg. Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

82—WASTE PIPE CLEANER safeguards sanitation

Mule-Kick Waste-Pipe Cleaner is claimed safer and more effective than other products available for this use. Manufacturer says that it is made of pure sodium hydroxide for maximum

Life in these excited states...

High-impact, rubber-plastic, most economical for average chemicals. ½ to 6". Screw or solvent welded fittings. Valves ½ to 2". NSF-approved. *Bul. 80A.*

An easier way to put corrosion under your thumb

Specify the equipment that's engineered to stay on the job under the toughest corrosive service . . . *Ace* equipment by American Hard Rubber Company. Now nine kinds of plastic and rubber pipe, plus pumps, valves, tanks, and special equipment to solve any corrosion or contamination problem.

Rubber or plastic lining is economical life insurance for costly "special" equipment. It's a specialty with ACE. Write for *Bul. CE-53.*

Choice of Riviclor PVC, Ace-Ite rubber-plastic, Ace polyethylene or Ace Saran to match *any* plastic pipe. Sizes ½ to 2". Also larger plastic-lined valves.

Ace-Hide, tough as a rhinoceros, insensitive to corrosives, makes this finest of acid pails. Also dippers, bottles, funnels, etc.

ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
Ace Road • Butler, New Jersey

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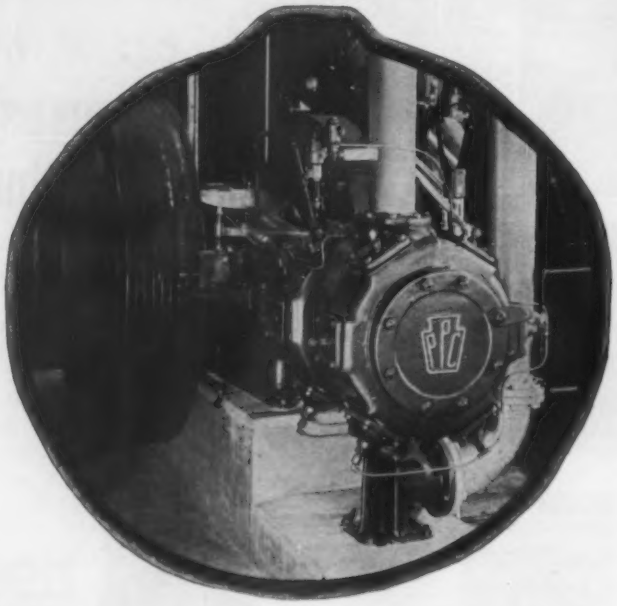
*with this valve

COMPRESSOR RUNS DAY AND NIGHT FOR 20 YEARS



Unusual? Yes, when you are not *getting* performance like this. No, when you have a Pennsylvania Compressor on the job. Long, long service without downtime is standard operating procedure with every Pennsylvania Compressor.

*Reason: the Pennsylvania Air Cushion Valve, constructed without nuts, bolts or screws. Stainless steel valve discs lift against a soft cushion of air; there is no flexing or bending action to weaken them. They will remain perfectly seated over long periods of service.

The compressor above delivered over 20 years of continuous performance . . . three days were lost once when it was moved, but that's all. Isn't it time you were on the receiving end of this kind of sure, sustained performance? Write today for your free copy of "Compressors for Industry" which describes Pennsylvania Compressors from 10 to 350 hp.

PENNSYLVANIA PUMP AND COMPRESSOR CO.

Easton, Pa. Earning Customer Confidence Since 1920

For more facts circle 646 on Reply Card

NEW PRODUCTS

(Begins on page 178)

stoppage-clearing strength, and is harmless and safe when used as directed. J. A. Sexauer Mfg. Co.

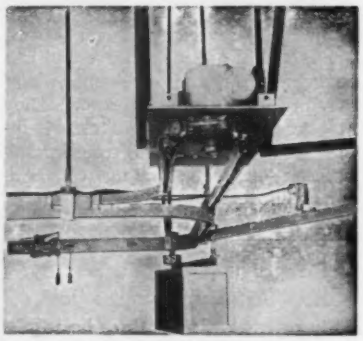
83—BUTYL SEALER with Neoprene rubber inserts

No. 168.3 Sealer is designed to prevent passage of air or moisture between similar or dissimilar surfaces. It consists of an extruded butyl mastic with Neoprene rubber insert—a combination that provides elastic adhesion and a resilient cushion to absorb pressure loads.

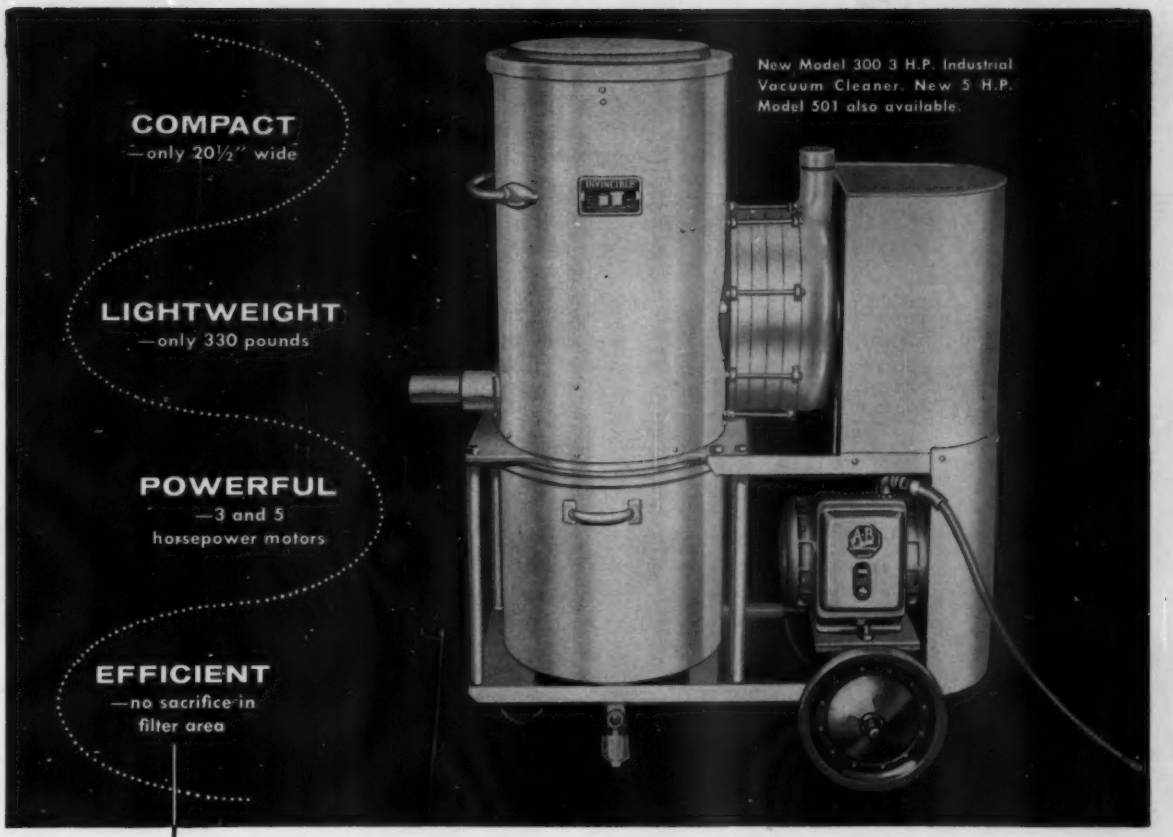
The material is suggested as a seal between clean surfaces of glass, aluminum, steel, rubber, marble and similar construction materials. It is aluminum-gray in color. Additional physical and chemical characteristics announced include excellent resistance to water and water vapors, acids, detergents and bases; non-corrosive to metal; service temperature range of —30 to 200 F; excellent adhesion to clean, dry surfaces; low heat and electrical conductivity. It is claimed as non-toxic, non-injurious to the skin. Presstite Div., American-Marietta Co.

84—CONVEYOR SYSTEM has route selector head

Power-Flex is a power and free overhead conveyor system designed to handle light, medium and heavier loads up to 600 lb maximum per work carrier. A feature of Power-



Flex is the Telematic Route Selector Dispatch Head which can be furnished with each carrier. Two route selector dials on the head can be set to automatically guide a carrier to any one of 80 stations in the system. Power-Flex is suggested for transportation applications involving storage banks, manufacturing work stations, segregations or integration of work carriers or inventory. Columbus McKinnon Chain Corp.



2 NEW INVINCIBLE
Industrial Vacuum Cleaners
For Heavy-Duty Cleaning in Close Quarters

These rugged, versatile Invincible Models are designed for use in highly congested areas and to meet specific requirements created by modern production methods and present day maintenance standards. They are engineered to reduce costs and increase efficiency on special production problems and intermediate applications that cannot be handled by undersize machines or economically by bulky, oversize equipment.

COMPACT—AND EFFICIENT. Even though these Invincibles are amazingly compact, filter area has not been sacrificed.

PORTABLE. Mounted on a swivel wheel carriage only 20½" wide and weighing less than 330 pounds, they follow the operator with a slight tug on the hose through narrow aisles and over rough floors.

VERSATILE. Designed for rough, heavy-duty service and continuous operation, they recover, reclaim and convey virtually any material: metallic litter, liquids, fabricated parts, dirt, dust, etc., etc.

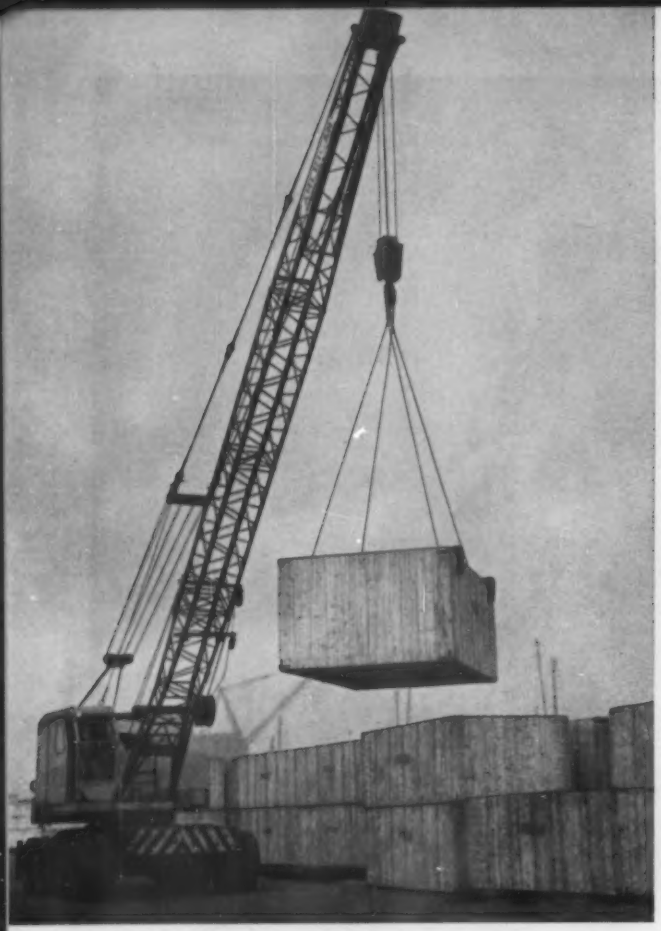
TROUBLE-FREE. Even highly abrasive litter is safely handled; no recovered material comes in contact with moving parts.

WRITE TODAY *for full details on new Invincible Models 300 (3 H.P.) and 501 (5 H.P.)*

INVINCIBLE

VACUUM CLEANER MFG. CO.
DOVER, OHIO
OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

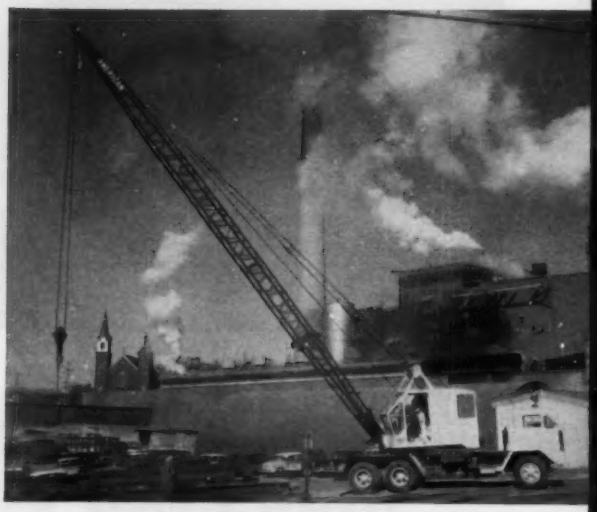
For more facts circle 647 on Reply Card



This 300 Series Self-propelled yard crane speeds up the unloading of crated autos for export at a Hoboken, N. J. pier.

MATERIAL MOUNTAINS MASTERED WITH AGILE AMERICANS

Crowded, busy yards or plants are a push-over for mobile Americans. Handling costs are shaved because seconds are saved, with the extremely maneuverable American Truck and Self-propelled Cranes. They provide *smoother lifting . . . precision spotting . . .* to help you get more work done in your efforts to keep materials moving.



Ideal for all kinds of yard duties, American 200 Series Truck Cranes are made specifically for tight budgets, tight quarters, tight schedules.

SMOOTHER LIFTING . . . PRECISION SPOTTING

- When you have two speed transmissions on American Truck and Self-propelled cranes you are assured accurate placing of loads without loss of horsepower.
- When the operator changes gears with the control lever, he automatically lowers his line speed, yet retains full horsepower without slipping clutches. This means a smoother swing . . . smoother, safer spotting of maximum loads . . . new control accuracy for steel erectors, bridge builders, shipyards, industrial plants . . . wherever loads need handling with infinite accuracy.
- Next time you see an American on the job, ask the operator . . . ask the owner . . . to show you how Americans are built to give you better service. Then contact your American distributor. He has complete detailed and illustrated catalogue information on American's entire line of crawler or truck crane models, capacities ½-yard, 12½ tons and up.

Serving industry for over 75 years

EXCAVATORS-CRANES to 2 yds.-60 tons
LOCOMOTIVE CRANES to 130 tons
DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

For more facts circle 648 on Reply Card

NEW BOOKS

for the plant engineer

Quality Control and Statistics

QUALITY CONTROL AND INDUSTRIAL STATISTICS by Acheson J. Duncan. Size 9¼ by 6⅜ in.; 946 pp including index; cloth bound. Published by Richard D. Irwin, Inc., Homewood, Illinois. Price $10.80.

AN EXTENSIVE treatment of quality control and industrial statistics is presented in this book. Mathematics appear often in the text with an appendix carrying mathematical proofs and tables. It is suggested that the potential student of this book have a working knowledge of college mathematics.

Part one of the book starts with fundamentals and takes in probability and random mass phenomena. This is followed by sections on frequency distribution, the sampling distribution of a proportion of a fraction, other important sampling distributions, acceptance sampling by attributes, acceptance sampling by variables, comparison of various types of sampling plans, general theory of control charts, and other subjects.

Glossaries of symbols and special technical terms are included in the appendixes as well as a bibliography of reference matter.

On Writing

WATCH YOUR LANGUAGE. Size 8¼ by 5½ in. approx; 276 pp including index; 1958 edition; cloth bound. Published by Channel Press, Inc., Great Neck, New York. Price $3.95.

THIS BOOK which promotes better writing contains material on good and bad usage of the English language. The many comments and examples in this guide were compiled from periodic bulletins prepared by Theodore M. Bernstein of the New York Times.

Principal topics of discussion in the book are following: usage of words, tips on story writing; syntax; helpful hints for copy readers, and headlines. At the end of the book there are examples of actual news stories.

Packaged Boiler Ratings

PACKAGED FIRETUBE BOILER RATINGS. Size 11 by 8½ in.; 19 pp; paper bound. Published by the Packaged Firetube Branch of the American Boiler & Affiliated Industries, 15 Park Row, New York 38, N. Y. Price $1.00.

OBJECTIVES and major activities of the Packaged Firetube Branch of the American Boiler & Affiliated Industries group are reported at the beginning of the booklet. Later the following topics are explained: purpose of the test procedure, types of boilers to which test procedure applies, ratings, heating surface, test setup and test procedure. The publication also includes general recommendations for the sizing of boiler equipment.

Boiler ratings of member companies are presented in a series of tables showing model numbers of units made by various manufacturers. These are accompanied by hourly steam capacities and heat output. The pamphlet also contains a reproduction of a form for recording data and results of a boiler test.

Lighting

I E S LIGHTING HANDBOOK, Third Edition. Size 9¼ by 6¼ in.; 1028 pp; illustrated; cloth bound. Published by Illuminating Engineering Society, 1860 Broadway, New York 23, New York. Price $10.00.

THIS BOOK contains the revised I. E. S. recommended foot-candle levels for every conceivable lighting task. The improved lighting levels result

Illustrated—New 9700 Series
Piggy Back Hydraulic Control Valve
Meets J.I.C. Standards

Look to Logan

the ultimate in hydraulic valve design

FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
838 CENTER AVENUE, LOGANSPORT, INDIANA

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- ☐ 100-5-1 ULTRAMATION CYLINDERS
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- ☐ FACTS OF LIFE
- ☐ 62 SURE-FLOW PUMPS
- ☐ 200-1 HYD. POWER UNITS
- ☐ 200-2 ROTOCAST HYD. CYLINDERS
- ☐ 200-3 750 SERIES HYD. CYLINDERS
- ☐ 200-4 and 200-7 HYD. VALVES
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COMPANY _____

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NEW! ERIEZ
HI-VI
VIBRATORY
FEEDERS &
BIN VIBRATORS

specially constructed for
HAZARDOUS, DUSTY LOCATIONS

FULLY ACCEPTABLE BY MILL MUTUAL FIRE PREVENTION BUREAU

First Mill Mutual Acceptable electro-permanent magnetic vibratory equipment at economical prices!

Vibratory Feeders – accurately feed and control bulk materials, from ounces to tons. Completely enclosed drive element, built-in glass fiber springs, impotted epoxy sealed electrical coil. Needs no rectifier.

Unit (Bin) Vibrators – keep hard-to-move materials flowing through bins, chutes, etc. Exclusive pinpointed vibration impact. Completely enclosed and sealed. No sliding or rotating parts to wear. No rectifier needed.

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Eriez Mfg. Co., 71-T Magnet Dr., Erie, Pa.

ERIEZ

For more facts circle 650 on Reply Card

NEW BOOKS

from the researches of Dr. H. R. Blackwell.

Tables show new recommended foot-candle levels for hundreds of tasks in various industries. Among those listed are airplane manufacturing, assembly operations, automobile manufacturing, bakeries, breweries, candy making, canning industries, central stations, chemical works, clay products, coal plants, dairy products, foundries, glass works, iron and steel plants, machine shops, paper manufacturing, printing industry, and welding.

Special sections devoted to industrial plant and office lighting and outside protective lighting make this book particularly useful to plant engineers. A liberal education in science of illuminating engineering can be obtained by reading the chapters explaining the physics of light, light and vision, measurement of light, color, light control, light sources, lighting calculations, interior lighting design, industrial lighting and applications of radiant energy.

Electrical Estimating

ESTIMATING AND ACCOUNTING MANUAL. Size 11½ by 11 in.; 14 ring loose-leaf binder. Published by Minnesota Electrical Association, Inc., 525 South 7 St., Minneapolis, Minn. Available on lease basis only, $35.00 first year and $12.50 renewal fee each year. Illustrated brochure free on request.

ONE OF THE BIGGEST stumblings to accurate estimating and scheduling of electrical work in the average industrial plant is the lack of accurate labor units. This book can help in hurdling this obstacle. With the estimating forms and labor units provided, you can determine quite accurately how long a job should take and how much it should cost.

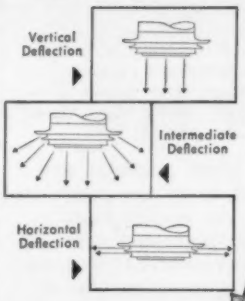
Aimed primarily at the electrical contractor the manual, nevertheless, contains material of interest to plant electrical groups. It includes information on the following: branch circuit wiring, feeders, switches and panelboards, lighting fixtures, special raceways, signals and communication, motors and motor control, electric heating, industrial services and control wiring.

Each section has tables detailing work normally performed and furnishes labor units in hours that you can apply directly to your estimates. These labor units are said to be 95 per cent accurate. A method is outlined for determining the labor effiency of your electrical crew.

Fresh air at working level improves employee efficiency

Barber-Colman industrial Venturi-Flo diffuser permits air to be introduced at the worker's level — duct work can be extended to provide a 10′ mounting height. This prevents stagnant, smoky air, which has collected near the roof, from being mixed with the incoming fresh air. Employee comfort and efficiency are improved considerably.

The Venturi-Flo industrial diffuser can be adjusted easily from the floor to deliver any air pattern. In warm weather, the air should be delivered close to, or even directly at, the worker; while during cool evenings, or



in cold weather, the air should be diffused above the head of the worker, providing ventilation without drafts.

A complete range of sizes available to meet any industrial requirement. Ask for Bulletin F-7722-1. Call your Barber-Colman Field Office or write:

BARBER COLMAN
BARBER-COLMAN COMPANY
Dept. R, 1139 Rock Street, Rockford, Illinois

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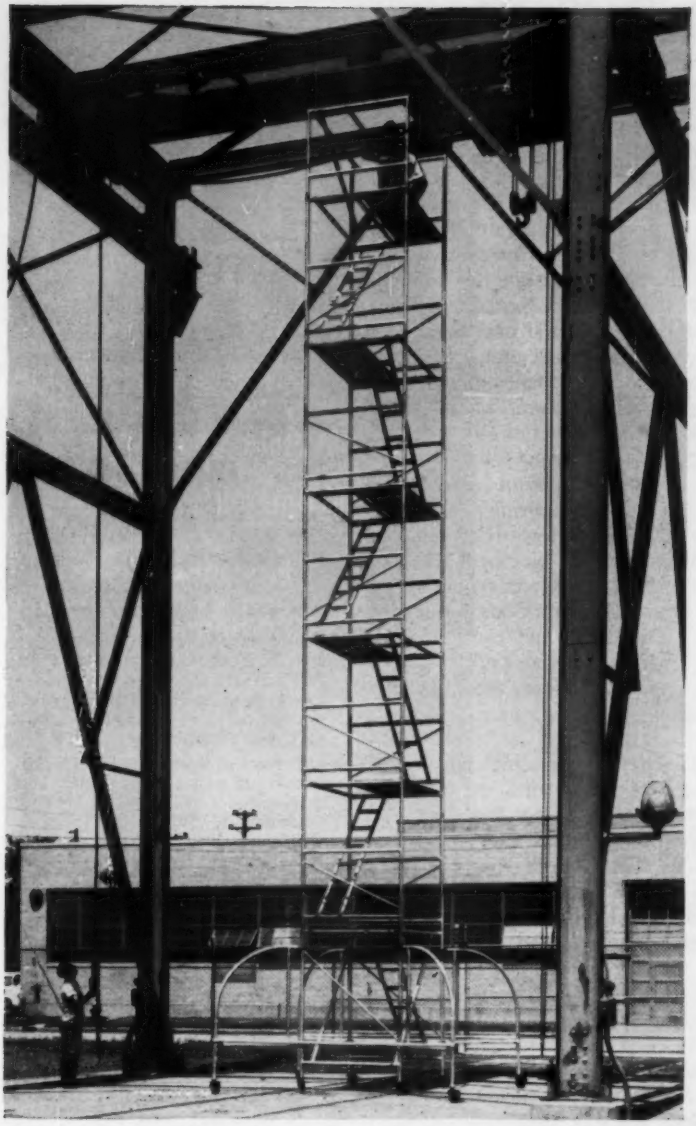

Aluminum Rolling Scaffold RAISES Efficiency ...LOWERS Maintenance Costs

Preventive maintenance is an economic necessity which accounts for millions of dollars of savings in equipment and materials each year. It can be costly in time, labor and life. However, when the job calls for getting off-the-ground . . . there's no safer, more economical way than with Aluminum Stairway Scaffolds. Scientifically designed, they are available in two basic styles. *Aluminum Sectional Scaffolds* are erected from separate frames, braces and stairways. All sections of "Fold-A-Way" Scaffolds fold into compact units. Base dimensions of both types are 4'6" x 6'. *Sectional Ladder Scaffolds* can be 29" or 4'6" wide in lengths up to 10'. Both styles are UL Approved. Shown at right: High clearance base section for all four scaffold types. Write for BULLETIN G-205RR

FOR GREATER SAFETY . . . EFFICIENCY . . . ECONOMY

THE PATENT SCAFFOLDING CO., Inc.

38-21 12th Street, Dept. PE. Long Island City 1, N. Y.
1550 Dayton St., Chicago 22, Ill.
West Coast: 6931 Stanford Ave., Los Angeles 1, Calif.
In Canada: 355 Dufferin St., Toronto • Branches in all Principal Cities

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MAKE DUMPING A
PUSHOVER!
AND CUT HANDLING COSTS

Looking for a safe, economical way to lift and dump any free-flowing material in one operation? Now you can easily handle all bulk material . . . in solid or powder form, and in any type of container, such as drums, boxes, barrels and even bags . . . with these material handling "power-houses."
All dumpers are flexible in design so they may be fitted to meet exactly with customers' specifications. Many built-in safety features are employed throughout to insure long hours of maintenance-free operation.

ESSEX
VERTICAL DUMPER
In one smooth operation this equipment can lift containers to any practical height, dump the contents and return the container to load position.

CESCO
Skip-Hoist DUMPER
For dumping heights of up to 20 feet, with 3000 pound capacity. Can be permanent or mobile. Also hand and electric powered Junior models available.

ESSEX
HYDRO-DUMPER
A hydraulically-operated dumper for dumping where no lifting is required. Mobile or stationary models available. Both will lift up to 3 tons.

Write for FREE catalog ——

ESSEX CONVEYORS, INC.
Dept. PE, 165 Franklin Ave., Nutley 10, N. J.

COLSON EQUIPMENT & SUPPLY CO.
1317 Willow Street, Los Angeles 13, California

For more facts circle 653 on Reply Card

The Packaged Boiler

(Continued from page 126)

of the burner and provide a precombustion and a postcombustion purge. It shall shut down the burner in two to four seconds in the event of pilot or main flame failure.

Control Panel. Control panel shall be mounted on the boiler front. It shall be a Nema type 1A metal cabinet, free from vibration and conveniently located for the operator. The panel shall contain the program relay, blower motor and heater starters and control switches. A damper positioning switch must be provided to permit automatic firing or continuous firing at any desired rate between low fire and maximum rating. All electrical equipment to be wired in conformity with the National Electric Code and local codes. Oil- heat- and moisture-resistant wiring materials must be used throughout. Unit must meet all requirements of local, state and city codes.

Efficiency. The unit must be guaranteed to operate at fuel-to-steam efficiency of not less than 80 per cent over the full range.

Shop Tests. Boiler-burner unit shall receive such factory tests as are deemed advisable by the manufacturer to check construction and operation. All tests may be witnessed by the purchaser if desired.

Starting Tests. After boiler installation is completed, the purchaser shall be provided with the service of a field representative for starting the unit and training the operator. **End**

"Oh, and thank you very much for the tie clasp."

'SEXAUER' EASY-TITE
Note imbedded Nylon plug locks screws automatically
Note Fiberglas backing resists closing squeeze

New Way to Stop Faucet Leaks!

★ **9-in-10 washers are fastened with TOO LONG or SHORT SCREWS thus loosen and destroy themselves. Leaks quickly follow!**

34 YEARS OF RESEARCH REVEALS NEW SOLUTION

★ **New, patented 'Sexauer' SELF-LOCK screws have imbedded expanding NYLON PLUG. They lock at required depth AUTOMATICALLY, hold washers firmly! Made of MONEL, they are rustproof, non-corroding. Heads can't twist off. Screw slots can't distort.**

★ **NEW, improved 'Sexauer' EASY-TITE faucet washers are made of super-tough, pliable du Pont compound (not rubber or fibre). Reinforced, like a tire, with a vulcanized layer of Fiberglas, they resist distortion and splitting from shut-off grind and squeeze.**

★ **Faucet leaks repaired with 'Sexauer' EASY-TITE washers and SELF-LOCK screws outlast ordinary repairs "6-to-1"!**

HIDDEN COSTS OF FAUCET LEAKS!

Hackensack, N.J. Water Co. and American Gas Association figures prove stopping just ONE PIN-HOLE SIZE (1/32") LEAK saves you 8,000 gal. water quarterly. A HOT WATER FAUCET LEAK repair saves you over $7.58 QUARTERLY in fuel and water bills. Fewer leaks also produce important savings on MATERIALS, LABOR and COSTLY FIXTURE REPLACEMENTS!

A 'Sexauer' Technician will make available our NEW Catalog, Edition "J", listing our entire line of over 3,000 TRIPLE-WEAR plumbing repair parts and tools. He will survey your fixtures, determine the repair parts needed and establish an efficient stock arrangement and control to prevent costly overstocking or shortages. You get this service without obligation. *Act now!*

J. A. Sexauer Mfg. Co., Inc., Dept. S-69
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Please send me a copy of your Catalog "J"
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Organization _____
Bus. Address _____
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SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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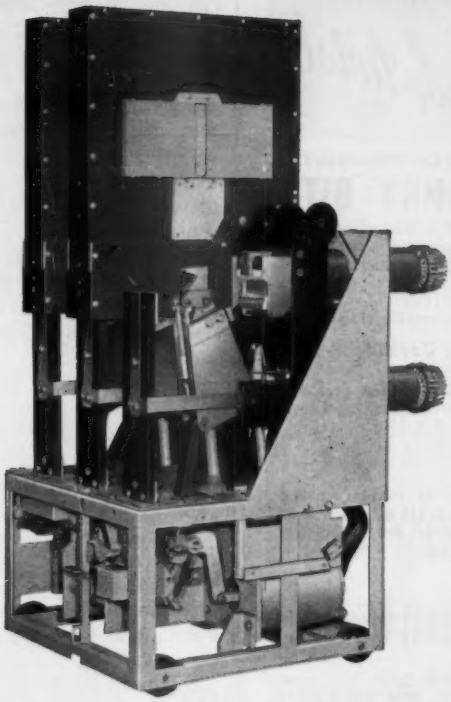
Now in service...
controlling and
protecting modern
generating and
distribution systems

NEW BREAKERS BEING ASSEMBLED AND SHIPPED



Type DST 5 kv 350 mva Air Circuit Breaker 1200 and 3000 amps

Federal Pacific's new 5 kv 350 mva Air Circuit Breaker

Your increased capacity requirements dictated its need. Our commitment to provide a complete quality line prompted its manufacture. Latest technicological advances shaped its development. Built for ruggedness, long life, ease of maintenance and inspection, it naturally meets all NEMA, ASA, AEIC and AIEE standards. Federal Pacific has created a new 5 kv, 350 mva Air Circuit Breaker of beautiful proportion, striking simplicity and masterful performance. Write for Bulletin 3-450, Federal Pacific Electric Company, General Offices: Department 259, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

For more facts circle 655 on Reply Card

Let the BIT DO THE WORK!
Switch from Steel Star Drills to...
NEW ENGLAND
Cyclo-twist®
Rotary Carbide-Tipped
MASONRY BITS
Drill more holes with less effort and at less cost. The "reasons why" are in this combination of features found only in N. E. Carbide Bits.

Ground Cutting Edges
No Carbide Hang-over
Carbide Tip is Copper Brazed for Longer Bit Life
Spiral Flutes Assure Positive Dust Removal from Cutting Zone
Heat-Treated, High-Quality Alloy Steel
SIZES: 7/64" to 1 1/2" diameter. Extra lengths up to 36".
SEND COUPON BELOW FOR FULL DETAILS
Other New England Carbide-Tipped Bits Include:
Cyclo-Core®
Multi-Tipped Bits for rotary drilling of hard masonry
Thunder-twist®
Bits for one-man hammer-drilling in any masonry from brick to granite
NEW ENGLAND CARBIDE
Designed, Engineered, and Proven for the Job.
COPIED, BUT NEVER EQUALED!
GET FREE DRILLING MANUAL

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55 Commercial St.
Medford 55, Mass.
Please send me a copy of the FREE "MASONRY BIT SELECTOR GUIDE"
Name.....
Address.....
City.....State.....
For more facts circle 656 on Reply Card

Industrial Air Conditioning

(Continued from page 130)

only. Constant temperature reheat controls and thermostats were located in each individual office. The problem of the large glassed areas on the north was solved by using special ducts to blow air directly down over the glass. See Fig. 4.

Ductwork in the manufacturing area is exposed at the 20-ft high ceiling. No zoning was required in this area as it is windowless and variations in temperature are readily overcome. Outdoor air supply to these units is through five hooded roof openings.

Ventilation for the plant was computed on the basis of 20 cfm per person. Exhaust is through fume hoods, exfiltration, and toilet exhaust systems.

Chilled water for cooling is piped to all the plant air-handling units from the five Trane CenTraVac hermetic centrifugal water chillers, each of which has 650 tons of cooling capacity. See Fig. 2. These units were chosen because of their capacity to meet automatically the wide variations of cooling encountered in big buildings. The chillers are mounted on the floor throughout the plant area adjacent to the air handling unit groupings. Each has its own cooling tower which is placed on the structure over the rest rooms.

Three of the chillers supply cold water to the plant manufacturing area air-handling units; one supplies the office-engineering area units, and one supplies laboratory and IBM area units. Laboratory and data-processing and office-engineering area chillers are interconnected with the manufacturing area cooling equipment in order to insure cooling continuity in the event that one of the units is being serviced.

All air conditioning equipment in the over-all system was placed to be easily accessible and yet require a minimum of floor space. Office-engineering-laboratory air handling units in the penthouse may be reached through a service stairwell. All cooling towers are at roof level and may be reached from the same boardwalk as the air handling units. All of the office air conditioning controls, wiring, damper motors and reheat controls are accessible through suspended panels. **End**

DOUBLE
ACTION ...double action diaphragm that works with push-pull operation... pumps 20 gallons per minute.
SERVICE ...double quick and easy for oils, cutting fluids, alcohol, gasoline, kerosene, fuel oil.
QUALITY ...extra life Nylon shaft bearings integral O-Ring seal, double diaphragm. Here is ideal, economical, easy to use hand pump for every place in your plant.
Write for folder to The Wayne Pump Co., Industrial Division, Fort Wayne 4, Ind., Div. Symington Wayne Corp.
WAYNE DD-1 HAND PUMPS

Wayne
HAND PUMPS
For more facts circle 657 on Reply Card

When Accessibility is a factor...

Specify Blaw-Knox Electroforged® Steel Grating and Treads

Around pickling, galvanizing, and quenching installations, Blaw-Knox Electroforged Steel Grating is preferred because it offers ready access to valves and piping both above and below walkways. Electroforged into one-piece sections, Blaw-Knox grating cuts to install easily, and can be removed easily for maintenance work.

For safe walking, Electroforged grating features a non-slip, twisted crossbar and a choice of either square or serrated bearing bars. Joints and crevices, where dirt and grease usually collect, are eliminated. Cleaning is just a matter of washing down.

For information on how to specify and order the Blaw-Knox Electroforged Steel Grating best suited to your needs, write for a copy of Blaw-Knox Bulletin 2527-R.

BLAW-KNOX

BLAW-KNOX COMPANY

Blaw-Knox Equipment Division
Dept. H, Pittsburgh 38, Pennsylvania

For more facts circle 658 on Reply Card

INDUSTRIAL FILMS

Packaged Boilers

A SOUND FILM on manufacturing packaged boilers is one of a series that will deal with the engineering installation and maintenance of hot water generators and marine generators.

The stripfilm shows in detail how a steam generator is made, from handling the sheet metal to the finished package boiler leaving the plant.

Slides of the 20-minute movie are shown with an automatic projector. The projector, operating on 110 a c and the film, may be obtained for showing to large audiences by writing to Cyclotherm Div., National-U.S. Radiator Corp., Dept. AQ., Oswego,

Mackinac Bridge

A NEW 16mm sound film deals with construction work on the hundred million dollar Mackinac Bridge. Special emphasis is placed on the construction of Mackinac's thiry-four concrete piers, since the superstructure phase has been well documented in other films. Events and problems leading up to this project are also a part of the film story.

"Carrying the Load" is now available for showing before engineering societies and other technical groups. To assure complete understanding of the problems of placing concrete under water, Intrusion-Prepakt has assigned members of its engineering staff to accompany the film when such arrangements are desirable to the sponsoring group. There is no fee or obligation.

Interested groups should contact: Advertising Department, Intrusion-Prepakt Inc., 568 Union Commerce Building, Cleveland, Ohio, or any regional office of the company.

Operating a Rubber Plant

"PROGRESS IN INDUSTRIAL Rubber Products" is the title of a new 16 mm color and sound movie describing the operation of a modern rubber plant.

The 25-min film reveals how raw materials are used to produce quality rubber products through improved production facilities. It describes the process of making such vital products as conveyor belts, wrapped and molded hose, fire hose, escalator hand rails and electrical insulating tapes. Scenes of modern laboratory facilities are highlighted showing the various routine and special tests performed on all raw materials and finished products.

Arrangements for showing the film may be made by writing to the advertising department, Quaker Rubber Division, H. K. Porter Company, Inc., Tacony and Comly Streets, Philadelphia 24, Pa.

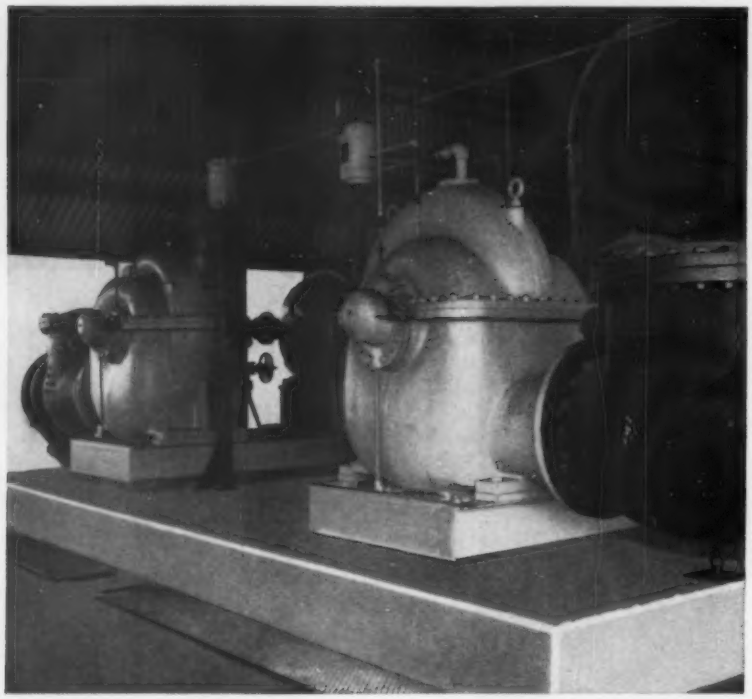
Manual Heliarc Welding

IN AN EIGHT-MINUTE long sound and color 16mm motion picture, the beginner is given an orientation in Heliarc welding—how it works and what it can do. The movie shows the basic pieces of equipment and their relationship to each other, how to make a simple weld, and the results that can be expected after practice. The film is available from any office of the Linde Company, Division of Union Carbide Corp., as are other movies on welding.

Search for Reliability

NEW DEMANDS on producer and product are entertainingly depicted in a color, 16mm film which takes a broad view of the pressures for higher reliability in all industry.

Basic theme of the film, and of the



the bigger your pumping problems... the better your reasons for giving them to ***WHEELER-ECONOMY***

St. Regis Paper Company did, at its Jacksonville, Fla., plant. The Units you see here are two Wheeler-Economy 30" x 24" Horizontally Split, Double Suction Pumps. They deliver 20,000 gpm each against a 60' head, to a surface condenser and several barometric condensers.

At C.H. Wheeler you can get help on large pumping problems that cannot be exceeded anywhere in scope and thoroughness. For example, Wheeler has one of the world's largest and best-equipped Pump Test Laboratories. Accurate scale models of complete circulating water intake tunnel structures for industrial power plant installations are built and tested in this Laboratory.

A full-staffed Engineering Department and modern manufacturing facilities are also available here. See your representative or write direct for expert advice on any pumping problem.

Economy Pump Division

C. H. WHEELER MFG. CO.

19th and Lehigh Avenue • Philadelphia 32, Pa.

Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

For more facts circle 659 on Reply Card

booklet which serves as an after-screening take-away piece, is that today's world is becoming increasingly "an automated, electronically regulated wonderland of technical wizardry."

In this swifter-paced, more complex environment, there is less and less room for error. Increasingly, all parts must work, even seemingly insignificant ones. The pressure is for ever-mounting reliability. Simplified mathematical explanations show how overall assembly reliability is the product, not the sum of all the individual component reliabilities.

Copies of the film, "Search for Reliability" together with copies of the booklet, are available for group showings. Write to A. W. Scott, Advertising Dept., Standard Pressed Steel Co., Jenkintown, Pa.

Serving Industry for 100 Years

"WHAT'S IN A NAME?", a new film produced by Gardner-Denver Co., shows how a firm celebrating its centennial serves the world's basic industries.

For example, part of the company's service to the petroleum industry is illustrated by scenes showing pipeline being laid near Monticello, Utah, while other scenes show company equipment at work in mines and quarries where mobile rigs equipped with rock drills have made blast-hole drilling easier.

Service to general industry is shown as air compressors and automatic machines used for drilling, fastening and wiring on assembly lines. Also described is the use of compressed air in producing foods and bottled drinks.

This film, which is in color, with sound, and runs for 17 minutes, is available without charge to interested groups by writing to Film Library, Gardner-Denver Co., Quincy, Ill.

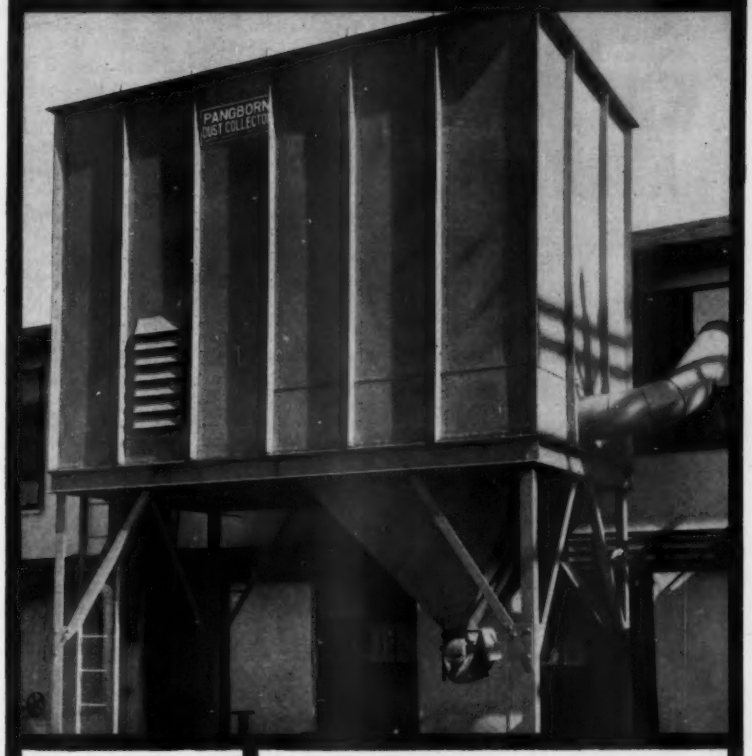
Floor Care Materials

THREE COLOR AND SOUND stripfilms, "The Story of Floor Wax," "The Story of Resinous Floor Finishes," and "Blue Blazes . . . the Non-Ionic Cleaner," discuss the basic ingredients and the various manufacturing steps and how they contribute to the finished product. Laboratory and actual on-the-floor tests are also shown.

"The Story of Floor Wax," shows how waxes are tested for such qualities as pH, initial color, non-yellowing, levelling, water resistance, wear resistance, etc.

Each film runs for 7 minutes. All three may be borrowed from Multi-Clean Products, Inc., St. Paul 16, Minnesota, or local Multi-Clean distributors.

TRAPS ALMOST 4 CU. FT. OF DUST PER WEEK



One small Pangborn Dust Control system replaces 8 collector units profitably at Precision Rubber Products

At Precision Rubber Products Corporation, Dayton, Ohio, millions of seals pass through a buffing process every year. The resulting dust could constitute an operating and housekeeping hazard. To facilitate dust control, the company replaced eight individual collector units with a central Pangborn Dust Control system. This installation saves floor space, operates quietly and gives efficient dust control (trapping almost 4 cu. ft. of rubber dust per week). Dust is now removed from *one* collector hopper instead of eight individual hoppers.

If dust is a problem in your plant, talk to the Pangborn man in your area or write PANGBORN CORPORATION, 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment—Rotoblast® Steel Shot and Grit.*

Pangborn CONTROLS DUST

For more facts circle 660 on Reply Card

WHY THERE'S NO "OR EQUAL" WHEN YOU SPECIFY WIREMOLD AIR DUCT

Unlike any other flexible air duct, Wiremold Air Duct is made with a *flat* metal spiral that *mechanically locks* to the fabric component. Here's what this construction means to you:

- With Wiremold you get a *mechanically locked* seam the same as you insist upon with sheet metal duct. There are no glues or adhesives that may dry out and fail with age.
- Wiremold's exclusive *flat* metal spiral assures accurate size — and snug connections.
- Cuffed ends (and cuffing equipment) are never needed.
- Unlike ducts with cuffed ends, Wiremold's fabric and metal are *both* secured to end fittings, making stronger connections.
- Two lengths of Wiremold can be joined simply by screwing them together. No collars or clamps are needed.

FOR AIR CONDITIONING • EXHAUSTING
MATERIALS HANDLING • MANY OTHER USES

WIREMOLD® AIR DUCT

ask your distributor, or write
THE WIREMOLD COMPANY • HARTFORD 10, CONN.

For more facts circle 661 on Reply Card

New Plant Construction

(Continued from page 160)

linked up as a "head end" unit to existing facilities. Work will begin soon for completion in late 1960.

Beaumont, Texas—Magnolia Petroleum Co., an affiliate of Socony Mobil Co., Magnolia Building, Dallas, Texas, plans to construct a plant to make high-purity ethylene. New facility will have an annual capacity of 380,000,000 lb of ethylene and is reported to cost an estimated $25 million. M. W. Kellogg Co., 711 Third Ave., New York, N. Y., is the construction contractor.

Houston, Texas—Humble Oil & Refining Co., 1216 Main Street, has awarded a contract for the construction of a $70-million project to expand company's natural gas facilities. A large processing and cycling plant will be built on the King Ranch in Kieberg County in South Texas. Plant will have an initial capacity of 800,000,000 cu ft of natural gas a day and produce 28,000 bbl per day of liquid products. Completion of the King Ranch plant is scheduled for the end of 1960, but some units will be in operation by the end of this year.

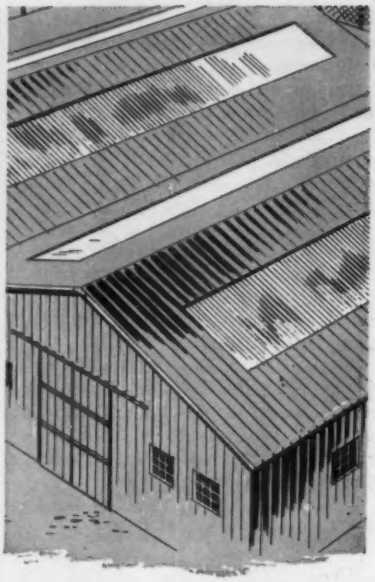
Houston, Texas—National Distillers & Chemical Corp., 99 Park Ave., New York, N. Y., plans to double capacity of company's polyethylene plant which has just began to produce. Present plant's capacity will be increased to 150,000,000 lb annually.

Bellwood, Va.—Reynolds Metals Company, Reynolds Metals Building, Richmond, Va., plans to spend approximately $1 million for expansion of the company's three plants near here. Company is setting up a drawn-tubing operation and as a first step, some 30,000 sq ft will be added to the present 230,000 sq ft extrusion plant. Present foil plant will be expanded by another 100,000 sq ft making it 250,000 sq ft in all, and an addition to the smelting plant will open the way for producing rods, bars and shot.

Washington, D. C.—H. W. Lay & Co., 173 Boulevard N. E., Atlanta, Ga., plans to construct a plant near here for the manufacture of potato chips. Plant will have a floor area of approximately 50,000 sq ft. Construction will begin in August, with completion and start of operations set for June 1960. Plant will cost an estimated $900,000.

Tear Sheets, Anyone?

Readers interested in obtaining tear sheets of articles should write to the Editor, PLANT ENGINEERING, 308 East James St., Barrington, Ill., or use the post-paid card elsewhere in this issue.



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- Best plastic panels you can buy! Longer life; up to 90% light transmission from new weather-tested resin bonded to superior quality fiberglass mat.
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Use new Stylux and save replacement costs over all other panels. Shatterproof, noncorrosive. Guaranteed uniform quality. Get literature, specs from your Building Supply Dealer, Glazing Contractor or write us direct.

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Buildings Division
BUTLER MANUFACTURING COMPANY
Dept. 113, 7400 East 13th Street
Kansas City 26, Missouri

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If you can't buy now... then LEASE

WANTED
NEW HEATING SYSTEM
...but must conserve capital
Manufacturers engaged in plant expansion or modernization plans must have modern, economical heating system, but must conserve capital for

Plant expansion or modernization plans may call for a new heating system, but working capital must be conserved for other uses. If this is *your* problem, the Dravo Heater Lease Plan offers an economical solution. You can have the money-saving heating you need *now*, without tying up your working capital. The following examples, based on actual installations, demonstrate how the Plan works:

EXAMPLE A—plant expansion program to include replacement of an outmoded steam heat system in both old and new buildings. Gas-fired space heaters with an output of 11,630,000 Btu's would be required to provide comfortable, even heating plus summer ventilation. In addition to lower maintenance costs, *savings in fuel alone would total $11,000 annually.* Further benefits in terms of increased worker efficiency could also be anticipated.

WITH THE DRAVO HEATER LEASE PLAN

This type of installation could be put to immediate use without capital investment. The Plan would cost:

Lease Plan Time	5 years
Cost per Year* (payable quarterly)	$8,010.00

With estimated annual fuel savings of $11,000, the Lease Plan would net the owners a saving of nearly $3,000 per year.

EXAMPLE B—a sprawling, high-roofed structure with uninsulated metal walls. Coke-fired salamanders inadequate for heating. Gas-fired space heaters producing 6,500,000 Btu's would provide and maintain comfort heating regardless of weather. *Valuable space would be saved, fuel and maintenance cost reduced by nearly $4,500 annually.* Worker efficiency would be increased because of the elimination of smoke and sulphurous fumes from the salamanders.

WITH THE DRAVO HEATER LEASE PLAN

This is a situation made to order for the even, low-cost heating supplied by Dravo heaters. Plan cost...

Lease Plan Time	5 years
Cost per Year* (payable quarterly)	$3,330.00

With estimated annual fuel savings of $4,500, the Lease Plan would have meant a saving of nearly $1,200 per year to the owners.

EXAMPLE C—a plant containing more than 48,000 sq. ft. of floor space with excessive heat loss through frequently opened truck doors. Economical, even heating impossible to maintain with old, coal-fired boiler. Dravo gas/oil-fired heaters, producing 4,000,000 Btu's, would provide a constant level of comfort heating. *Estimated savings in fuel and other costs would total $5,800 a year,* in addition to saving valuable floor space.

WITH THE DRAVO HEATER LEASE PLAN

An installation of this type would bring immediate benefits in terms of comfort heating. Here is how the Plan costs would look:

Lease Plan Time	5 years
Cost per Year* (payable quarterly)	$2,600.00

Again, savings far outweigh the cost of the heaters on the Dravo Heater Lease Plan.

*Note—this does not include installation costs.

These examples indicate what can be achieved with a modern, economical Dravo Heater installation. If you are engaged in expansion plans, Dravo Heaters, purchased on the Dravo Lease Plan, offer immediate savings and the retention of capital for other uses. A letter or phone call will bring you complete information. Use the coupon or phone: Dravo Corporation, Pittsburgh 25, Pennsylvania.

DRAVO
CORPORATION

DRAVO CORPORATION, Pittsburgh 25, Pennsylvania

Please see that I get full information on the new Dravo Heater Lease Plan.

Name_____

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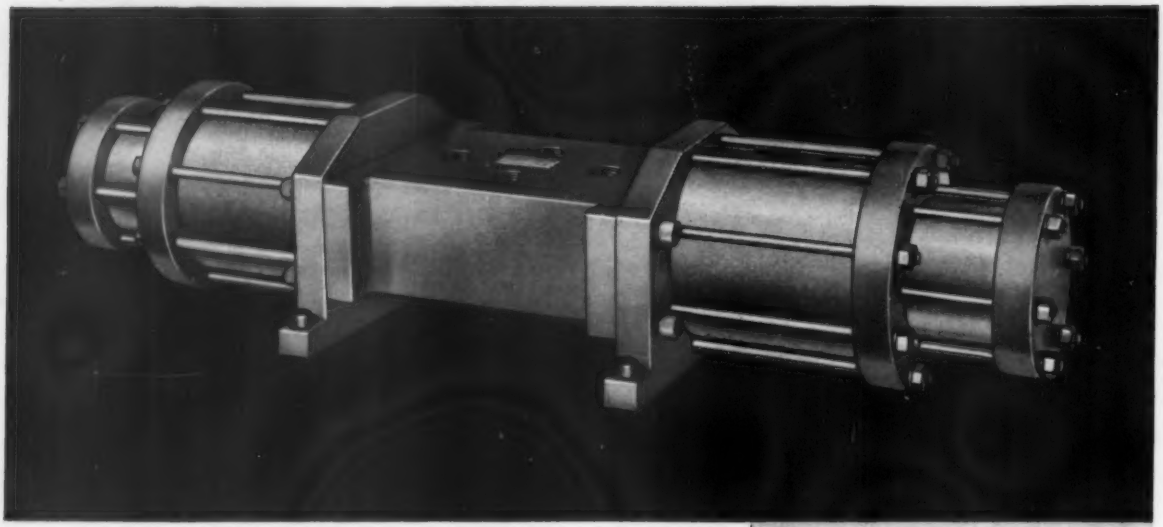
HYDRAULIC VALVES

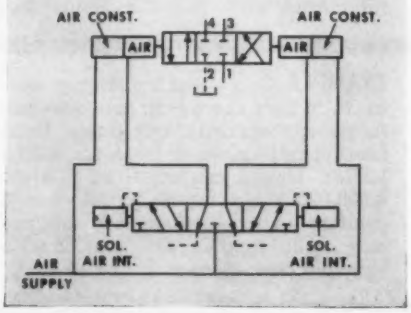
First Choice in the Steel and other Heavy Industries



Here's Why!

Over 20 years of specialized experience designing—and building—hydraulic operating valves for rugged industry requirements . . . ½" to 8" sizes . . . Zero leakage on water, soluble oil and water, or oil . . . Valves to meet any application . . . No metal to metal seating . . . Easy field maintenance . . . Inexpensive maintenance parts . . . For utmost dependability and service call the Hunt man.

1½" Three Position 4-way Air Pilot Operated 2000 p.s.i. Valve for Oil or Water Service. Other Designs to 5000 p.s.i. Control Circuit Diagram Below Shows Automatic Return to Mid Position.



More startling HUNT designs to come!

40 1919 1959 YEARS of Service

HUNT

Quick-As-Wink*® AIR AND HYDRAULIC CONTROL *Valves

Manufactured by HUNT VALVE COMPANY, 2082 East Pershing St., Salem Ohio

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64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	
137	138	139	140	141	142	143	144	145	
146	147	148	149	150	151	152	153	154	
155	156	157	158	159	160	161	162	163	
164	165	166	167	168	169	170	171	172	
173	174	175	176	177	178	179	180	181	
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DATA FILE

301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
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ADVERTISED PRODUCTS, SERVICES

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BULLETINS

101	102	103	104	105	106	107	108	109	
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BULLETINS

(Begins on page 21)

HEATING, HEAT EXCHANGING

149 Electric Unit Heaters—Complete specifications and construction information on a line of electric unit heaters are presented in Bulletin 808. Includes data on sizes 9 to 36 kw, as well as the smaller 1½ to 7½ kw. Ilg Electric Ventilating Co.

150 Heating Equipment—Bulletin 581 describes heat transfer products, including hairpin heat exchangers; fired indirect heaters for heating air, gases, chemicals, oils, asphalts, superheating steam and other vapors; tank heaters and coolers for bulk heating of gaseous or liquid materials; and packaged boilers. Brown Fintube Co.

151 Heat Exchangers—Advantages and performance characteristics of Alcotwin longitudinal finned-tube heat exchangers and thermal heaters are described in 12 pp Bulletin FH-3-R. The exchangers are designed for high heat transfer rate and fluid flow at low cost. Bulletin details finned-tube equipment for process applications and includes isometric cutaways and exploded views of complete units and regular and high pressure closures. Gives dimensions, and mechanical specifications for steel and nonferrous heat exchangers. Alco Products, Inc.

152 Heat Exchangers—Specification Manual M-100 is a 10 pp guide to double pipe or hairpin heat exchangers. In addition to general specifications, there are sections on design, materials, welding procedure, testing, inspection and stamping as well as assembly. Brown Fintube Co.

AIR HANDLING

153 Propeller Fans—Detailed information on company's self-cooled motor propeller fans is presented in 20 pp Catalog 159. Includes selection data, specifications, details on fan construction and dimensions. Ilg Electric Ventilating Co.

154 For Air Handling—Sixteen-pp Bulletin 518 illustrates and describes manufacturer's products for air filtering, cooling, heating, cleaning (controlling process dust), moving, exhausting, humidifying and dehumidifying air. These include Kennard, Herman Nelson, Illinois Engineering and American Air Division product lines. Fully illustrated, booklet provides brief application suggestions, capacity data. American Air Filter Co. Inc.

155 For Air Purification—Twelve-pp Bulletin 108 A describes and illustrates Dorex activated carbon air purification equipment—C cells and H cannisters. Data on equipment selection, installation and application is given, also information on Dorex replacement service. Discussions of activated carbon and how to achieve conditions generally necessary for proper purification are included. Connor Engineering Corp.

156 Space Filter—Performance, construction and installation details on company's space filter with replaceable elements, designed for high efficiency air filtration are presented in 8-pp Bulletin 1505-6. Typical applications are described. Mine Safety Appliances Co.

ELECTRICAL

158 Synchronous Generators—Bulletin GEA-6815 describes design features, construction and applications of company's high-speed synchronous generators. Illustrations show manufacturing techniques and typical installations. General Electric Co.

159 Small Motors—Eight-pp Catalog R-1 describes four types of a-c shaded pole, reversible, nongeared motors manufactured by the company. Complete information on performance characteristics, ratings, construction, dimensions and typical uses given. Barber-Colman Co.

160 For Rewound Motors—Eight-pp Booklet B-7622 describes a solventless epoxy encapsulation-type insulation for rewound motors. Outlines physical and chemical properties and describes typical applications. Westinghouse Electric Corp.

161 Dry-Type Transformers—Eight-pp Bulletin GEA-6668A describes company's open dry-type transformers featuring inorganic insulation to add to transformer life. Installation and maintenance information outlined and electrical and mechanical features charted. General Electric Co.

162 Distribution Transformers—Bulletin GEA-5683A describes company's oil-filled, single-phase, pole-type conventional and self-protected transformers for industrial and other Hood-lighting applications. Includes ratings. General Electric Co.

163 Low Voltage Equipment—The 84 pp Buy-Log (GEC-1100) is a condensed buying catalog of low voltage distribution equipment, including circuit breaker load centers, fuse puller panels, safety switches, wireway, molded-case circuit breakers and enclosures, panelboards, busway. It is designed so that application, selection, pricing and ordering information can be found easily. Features include selector charts for each product type, pictorial descriptions, consolidated pricing tables. Also included are ratings, weights, dimensions, standard quantities. General Electric Co.

164 Industrial Motor Controls—Magnetic contactors, starters and reversing contactors, together with diagrams of enclosures and dimensions, are presented in this 12 pp bulletin. Covers starter-relay combinations, combination starters and enclosure, as well as multiple pump controls, overload heater tables and overload relays. B/W Controller Corp.

Reader Service Cards for ordering bulletins are on the facing page. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

165 Manual Starters—Eight-pp Bulletin 11B1 introduces a line of manual starters, and contains data covering design, dimensions, ratings and prices. Starters described are rated through 7½ hp a-c and 2 hp d-c. This manual starter includes a "Jog-Run" accessory for factory or field installation. Furnas Electric Co.

166 High-Voltage Starters—Eight-pp Bulletin 8130 describes high-voltage starters for squirrel cage, wound rotor, and synchronous motors, in both air-break and oil-break forms, for use on 2200 to 4800-v systems. Covers various enclosures available, including those for outdoor installations as well as for hazardous locations. The Electric Controller & Mfg. Co., Div. Square D Co.

167 Mercury Switches—Twelve-pp Catalog 90b illustrates and describes a standard mercury switches for a-c or d-c applications, Included are photos, dimensions, electrical ratings, drawings, application information and technical data. Micro Switch, Div. Minneapolis-Honeywell Regulator Co.

168 Guide to Millivoltmeters—Operating principles, specifications, features, and ordering information on non-control and control millivoltmeters are presented in 28 pp Catalog C 10-1. Dimensional diagrams and photos illustrate details. Minneapolis-Honeywell Regulator Co.

169 Multi-Conductor Cable—Polyvinyl-insulated, multi-conductor cable for installing 6 to 56 pairs for thermocouple wire at one time is described and illustrated in Catalog 33. Advantages are detailed, and specifications, resistance chart, and electrical properties table included. Thermo Electric Co., Inc.

170 Electrical Connectors—Featured in 48 pp Bulletin 2711 is a line of electrical connectors, including plugs and receptacles in environment-resistant construction. Design and construction features are detailed and cutaway views and dimensional diagrams included. Crouse-Hinds Co.

171 Carbon Brushes—"How to get the most out of your carbon brushes" is the subject of this 8 pp monograph. It contains detailed information on manufacture, use and maintenance of carbon brushes and related types. Superior Carbon Products, Inc.

172 Electrical Insulation—Twelve-pp Bulletin GET-2929 describes in text, tables and pictures the characteristics and application range of insulating materials for electrical systems. Includes data on mica mat, varnished cloths and papers, insulat-

BULLETINS

(Begins on page 21)

ing varnishes, wire enamels, irradiated polyethylene, sealing and filling compounds, insulating finishes and adhesives. General Electric Co.

LIGHTING, COMMUNICATION

173 Readout Lamps—Featured in this bulletin are devices for the display of luminous letters and numerals in various types of dials and indicators in readout equipment. Devices described produce light by the phenomenon of electro-luminescence. Westinghouse Electric Corp.

175 Luminaire Maintenance—Brochure PWB-59 describes metal poles and wall bracket units for outdoor applications with disconnecting and lowering mechanisms that permit one man to relamp and clean luminaires —at ground level—within minutes. Illustrates typical installations, and includes ratings, electrical characteristics, capacities. The Thompson Electric Co.

176 Loudspeaker Guide—Selection of the proper loudspeaker for a given application is simplified by this fold-out brochure, Form 3R 3509, which permits comparison of various loudspeakers, horns and drivers. Information given includes response, sensitivity, power-handling capacity, and other characteristics, and application data. Radio Corp. of America.

MATERIALS HANDLING

178 Powered Industrial Trucks—Featured in this 12 pp bulletin are powered industrial trucks, including fork trucks, heavy duty fork trucks and ram trucks, low lift platform trucks, high lift platform trucks, die handling trucks and mobile cranes. Specification tables and photos of the various models are included. The Elwell-Parker Electric Co.

179 Walkie Truck—Applications of small electric powered walkie trucks are detailed in this product bulletin which contains descriptions of seven basic walkie types. Selection tips included. The Moto-Truc Co.

180 Hand Traveling Cranes—Bulletin DH-468-B presents cranes, with safety factor of 5 to 1, for industrial applications where accurate spotting of loads is more important than fast travel speeds. These units, company's Type B-9 top running, single bridge, hand traveling cranes, come in 1- to 10-ton capacities, spans to 50 ft. Features of construction, weights, dimensions etc. given. Wright Hoist Div., American Chain & Cable Co., Inc.

181 Heavy-Duty Hoists—Featured in 12 pp Bulletin 920 is a line of low-headroom electric hoists. Included are details, mounting option information, performance data and dimensions. Hoists come in four frame sizes, ½- to 10-tons. Robbins & Myers, Inc.

182 Lever-Operated Hoists—This safety chart illustrates safe handling of company's lever operated hoists in a variety of industrial applications. Drawings illustrate correct operating procedure. Manning, Maxwell & Moore, Inc.

183 Electric Hoists—Low headroom, heavy duty electric hoists are featured in 12 pp Bulletin H-113. Advantages are detailed and dimensional diagrams and tables are included. Northern Engineering Works.

SAFETY, SANITATION

184 Guide to Fire Extinguishers—This 6 pp folder contains a table comparing characteristics of various types of fire extinguishers. A bar graph shows the comparative effectiveness of extinguishing agents according to UL ratings. Ansul Chemical Co.

185 Group Washing Equipment—Featured in 28 pp Catalog 5601 is a line of group washing equipment and drinking fountains. Compares individual vs group facilities and includes detailed specifications, typical roughing-in dimensional diagrams, and other data. Bradley Washfountain Co.

INSTRUMENTS, CONTROLS

186 Flow Meter Applications—Eight-pp Bulletin MSP-160 describes many applications for company's Ring Balance meter and highlights outstanding features of the versatile instrument. Discusses its use as a wide range flow meter; electronic receiver; computer for measurement of net weight of solids in a fluid stream; Btu measurement in a heat exchanger; electrical flow signal transmitter; ratio controller; others. Controls Div., Hagan Chemicals & Controls, Inc.

187 Electronic Thermometer—Bulletin B describes applications of Thermophil thermistor thermometers on various surfaces, liquids, air and gases, rubber and plastic masses in a wide variety of industries. Lists individual temperature ranges for various models and includes specifications such as speed of response, reproducibility, accuracy, size, weight and power, Atkins Technical, Inc.

188 Level, Flow Control—Operating and safety controls for a wide variety of jobs involving liquid level and liquid flow are described in 24 pp Bulletin ERS-A. Featured are float-operated valves and switches and flow switches, with typical application stories, schematic drawings, electrical wiring diagrams and engineering data. McDonnell & Miller, Inc.

189 Liquid Level Indicator—Bulletin WG-1824, Supplement B, describes a miniature transistorized secondary liquid level indicator. Covers construction details, advantages, weight, dimensions and gives instations diagram. Yarnall-Waring Co.

190 Humidity Recorder—Complete information on a relative humidity recorder for use with a wet and dry bulb assembly is given in Data Sheet ND46-92. A listing of specifications and accessories is included. Leeds & Northrup Co.

191 Colorimetric Analyzers—Eight-pp Bulletin 1156-1 describes industrial instruments available for colorimetric determinations of trace quantities of substances dissolved in liquid process streams. Gives details on analyzers for dissolved silica, dissolved oxygen and total water hardness, and includes diagrams. Milton Roy Co.

192 Chemical Analysis System—Described in this 8 pp brochure is the AutoAnalyzer, an automated system for continuous chemical analysis, that can analyze trace materials down to parts per billion, continuously record results. Principles of operation and system's components are detailed, industrial applications listed. Technicon Controls, Inc.

193 Gas Analyzers—Described in 12 pp Publication 55-668-27 are Orsat gas analyzers for industrial and scientific gas measuring. Specifications are included. The Hays Corp.

194 Flexible Controls—Applications and advantages of Tru-Lay push-pull controls for continuous or intermittent transmission of reciprocal motion are detailed in this 16 pp bulletin. Construction features, control dimensions and control selection data. American Chain & Cable Co., Inc.

OTHER EQUIPMENT

195 Rubber Seals—This 24 pp Fact Book provides selection and installation information on company's Quadring and O-ring seals. Diagrams showing details of design are included, as well as specifications and information about media in which various rubber compounds can be used. Minnesota Rubber Co.

196 Grout Failure Prevention—How to avoid shrinkage through use of properly applied nonshrink grout is told in this 16 pp booklet. Describing successful grouting techniques with Embeco grout, bulletin outlines and illustrates common methods of grouting different types of equipment, mixing and placing of grout and hot and cold weather grouting. Information on recommended mixes and estimating tables plus actual installations are included. The Master Builders Co.

197 Epoxy Cement—Featured in this bulletin is detailed information on Metalset A4, an epoxy resin aluminum cement furnished in self metering tubes. Gives illustrated examples of typical applications and data on the compound. Physical data table is included. Smooth-On Mfg. Co.

198 Automatic Boilers—Eight-pp Bulletin 1250 describes mechanical pressure atomizing oil-fired and partial pre-mixing gas-fired, packaged automatic boilers. Outstanding features are detailed and table of ratings, dimensions, and weights is also included. Orr & Sembower, Inc.

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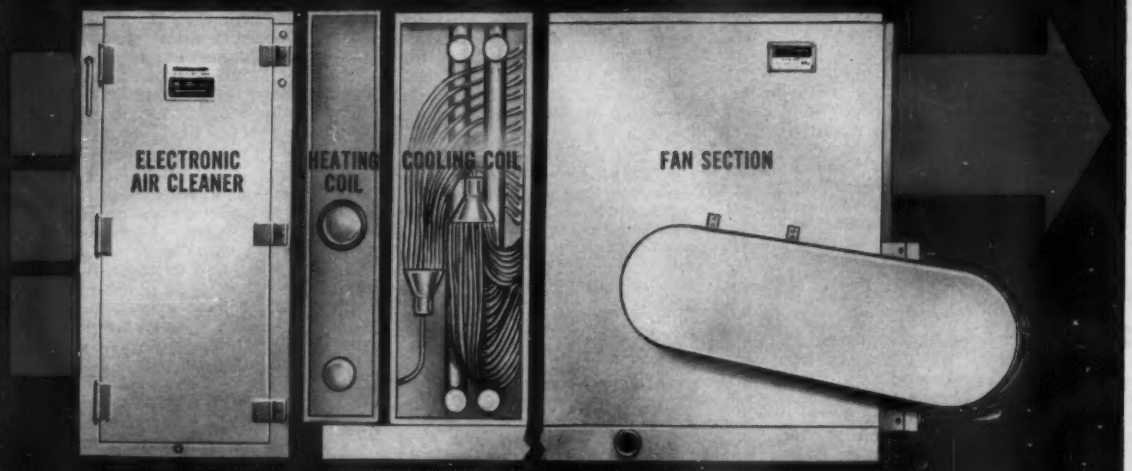

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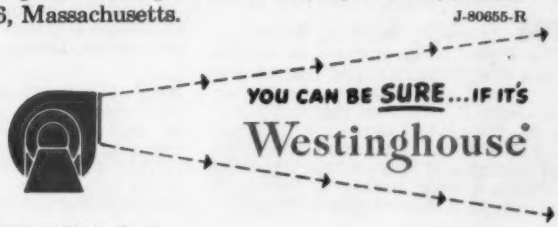

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BULLETINS

(Begins on page 21)

199 Fiber Facts—Presented in 50 pp Bulletin 5005 is detailed fiber data and textile information. Includes glossary of textile terms, tables of fiber properties, denier conversion tables, and textile bibliography. American Viscose Corp.

200 Safety Ladders—Featured in Bulletin SL-1 is a line of safety ladders for a variety of industrial applications. Table of sizes and dimensions is included. The Patent Scaffolding Co., Inc.

201 How to Use Teflon—This excellent "how to" brochure, 36 pp, tells how to use sheets, rods, tubes, tape and other standard shapes of Teflon. Covers electricalm chemical equipment, mechanical and non-adhesive applications of the versatile material, and discusses its general characteristics and properties. Other subjects treated include safety precautions, use of additives with Teflon, standard products, fabricating techniques. Prepared by duPont, this updated guide to Teflon use is made available to qualified plant engineers. Commercial Plastics & Supply Corp.

202 Rust Prevention—This 20 pp booklet presents basic information about rust, its causes and application of preventives. Included is factual data on the various types of rust preventing liquids, their recommended applications, and other details. Rust-Lick, Inc.

203 Aluminum Tube—This 32 pp catalog contains detailed information on company's drawn aluminum tube and extruded aluminum tube and shapes. Describes special features of the metal, metallurgical aspects, mechanical, physical and chemical characteristics, tolerance standards and extrusion definitions. Wolverine Tube, Div. Calumet & Hecla, Inc.

204 Filing Equipment—Vertical and roll filing systems are illustrated and described in 12 pp Catalog 4-59. Design and construction details are shown and dimensional data given. Plan Hold Corp.

205 Selsyn Systems—Illustrated with photos and diagrams, 6 pp Bulletin GEC-1527 describes company's selsyn systems for a variety of applications. Operation, applications, and ordering instructions are included along with selection and mounting charts, torque-resistance curves, and dimension charts and drawings. General Electric Co.

206 Indexing Machine Chassis—This 8 pp brochure explains advantages of company's turret type chassis for special processing and assembly machines. It points out significant features, gives dimensional specifications and operational data, and shows typical examples of uses for machines that perform a wide variety of automatic operations. Swanson-Erie Corp.

207 Magnetic Servo Amplifiers—High power transistor magnetic servo amplifiers are featured in 8 pp Bulletin S-961. Illustrated with photos, diagrams and charts, booklet contains detailed engineering and performance specifications and transfer characteristic curves. Magnetic Amplifiers, Inc.

208 Condensate Filtration—Technical Reprint T-172 contains an 8 pp discussion on filtration of condensate as part of the high rate condensate scavenging process. How filtration is being used in connection with scavenging at various power plants, including supercritical, nuclear and monotube boiler installations told. Graver Water Conditioning Co.

209 Heat Transfer Cement—Six-pp Bulletin 300 describes a heat transfer cement which eliminates the need for jacketed equipment. Describes advantages and properties of the material and illustrates typical applications. Thermon Mfg. Co.

210 Shipping Containers—Illustrated and described in 12 pp Bulletin 801 are reusable steel and aluminum containers for shipping of critical parts and containers. Advantages are detailed and specification and dimensional data included. De Vilbiss Metal Fabricators Co.

211 Carbon, Graphite Equipment—Featured in Catalog Section S-5008 is a line of carbon, graphite and impervious carbon and graphite equipment for chemical processing applications. Presents shell and tube heat exchangers, cascade, concentric and immersion type heat exchangers, centrifugal pumps, entrainment separators, pipe and fittings, towers and accessories, others. National Carbon Co., Div. Union Carbide Corp.

212 On Coal Crushers—Five new bulletins describe reduction machinery for coal, alum, bones, salt, chemicals. Bulletins 937 and 939 cover single roll crushers and flex-tooth crushers respectively. Bulletin 938 deals with manufacturer's single roll Stokerkol sizer for production of premium size stoker coals. Bulletin 940 covers the Flexroll coal crusher for reducing small capacities of coal to stoker sizes. Leaflet 949 describes a heavy duty slugger crusher for large rock, etc. Jeffrey Mfg. Co.

213 Freon Solvents—Applications of Freon solvents for hand-cleaning operations as well as in batch or continuous degreasing equipment are detailed in this product bulletin. Properties of Freon solvents are tabulated and advantages pointed out. E. I. du Pont de Nemours & Co.

214 All-Purpose Engines—This 12-pp illustrated brochure describes industrial and other engines available in company's all-purpose power line. Gives power ratings and overall dimensions on over 100 in-line, "V" and turbopower engines. Detroit Diesel Engine Div., General Motors Corp.

215 Carbide Cutting Tools—Comprehensive information on carbide cutting tools, blanks and inserts is presented in 72-pp Catalog 59. Covers reamers, drills, end mills, milling cutters, counterbores, single point tools, blanks and inserts, and includes an illustrated section providing grinding and operating suggestions, a selection table for determining correct carbide grades and carbide grade recommendations. Wendt-Sonis Co.

216 Packaged Chillers—Sixteen-pp Bulletin 8325 describes redesigned packaged water chillers for air conditioning and industrial cooling applications. Outlines advantages of the units and illustrates mechanical specifications. Schematic wiring diagrams show control panel wiring, control circuit wiring. Also shown are pneumatic control connections. Selection data provided covers all sizes. Industrial Div., American-Standard.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 263 and 264.

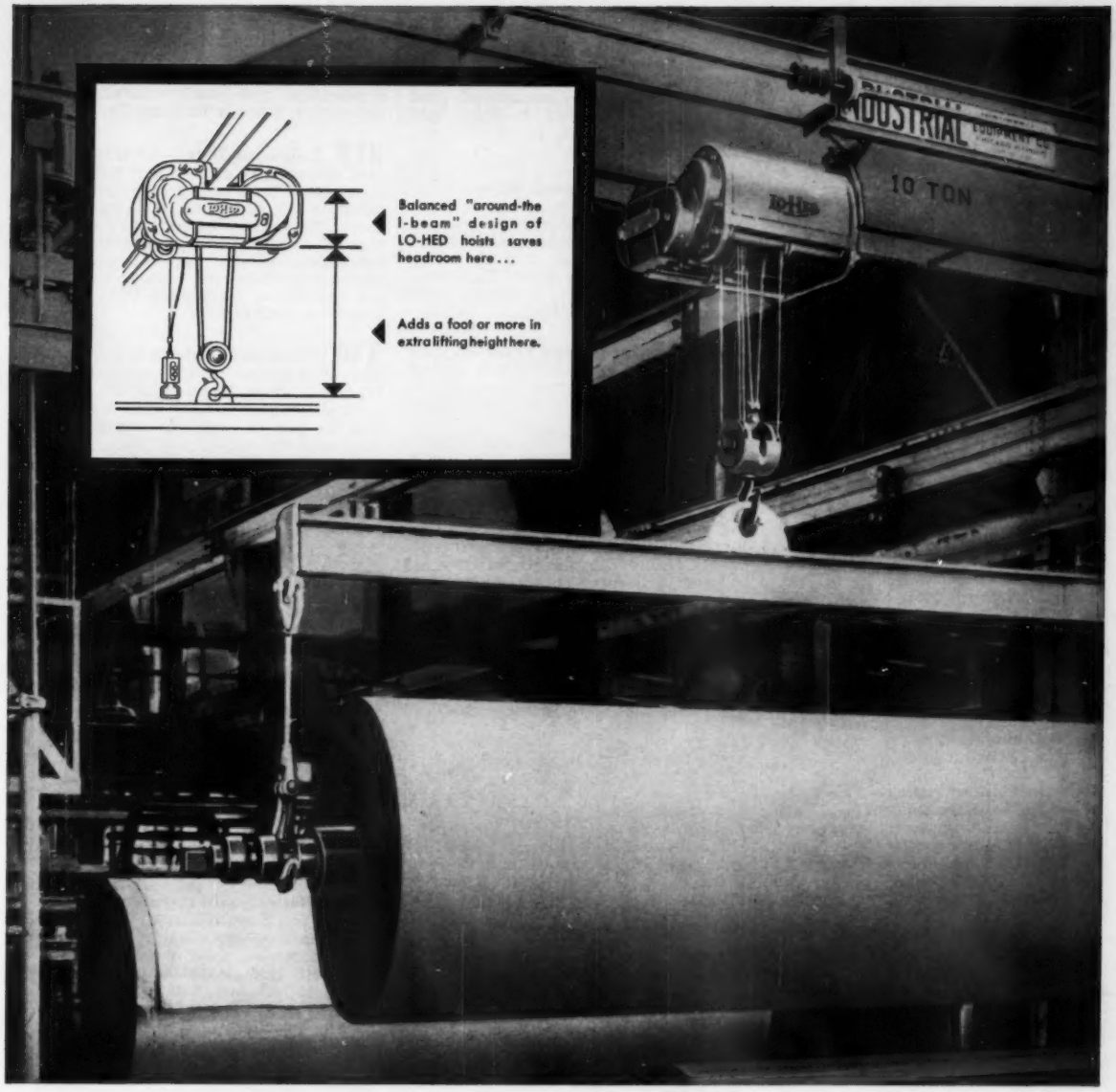
HEATERS, HEATING

301 Heating and Ventilating—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed and typical installations pictured through drawings and photos. Lennox Industries Inc.

302 Direct Fired Heaters — Complete description and specifications on unit heaters, duct furnaces and heavy duty heaters are presented in 12-pp Bulletin A1-1.2b. Cutaway views and construction features are included. Reznor Mfg. Co.

303 Unit Heaters—Eight-pp Bulletin UH858 contains detailed information on company's line of gas-fired unit heaters for a variety of applications. Design and installation data is given, as well as performance results, dimensions. Grinnell Co., Inc.

304 Tank Heaters—Bulletin HK-456 features a line of tank heaters and tank and heater units for heating water with steam or water. Selection data includes capacity curves, temperature factor table, and dimensions, surface areas, tables of ratings. Bell & Gossett Co.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DATA FILE

(Begins on page 268)

305 Thermo-Panel Coil—Technical Data Bulletin 355 is a 48-pp guide to company's panel coil for heating and cooling applications. Features of materials and design are illustrated and described, and detailed specification and dimension tables, heat transfer coefficient charts, capacity tables, other data are included. Dean Thermo-Panel Coil Div.

INSULATION

306 For Insulation Protection—Provided in this comprehensive looseleaf manual is technical information covering practically every requirement for insulation protection. An aid to proper adaptation and application of mastics, flashing compounds, adhesives and surface coatings, this book presents information classified as to industry usage, as power, process, cold storage. Book is available to qualified plant engineers. Benjamin Foster Co.

307 Curtain Wall Insulation—Booklet FB-104, 12 pp, describes Foamglas, a celular glass insulation for curtain wall construction. Outlines physical properties of Foamglas and recommended specifications. Ten outstanding curtain wall buildings are featured. Pittsburgh Corning Corp.

308 Insulation Coating—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster, or composition surfaces. Lists applications. J. W. Mortell Co.

309 Pipe Insulation — This 40-pp catalog was designed as a reference guide to company's pipe insulation, presenting a new way to specify proper thickness for pipe insulation, based in the "J" factor. Book also shows how single-layer insulation is applied. Union Asbestos & Rubber Co.

MECHANICAL POWER TRANSMISSION

310 Compact V-Belt Drives—Bulletin A-695 contains 44-pp of information on Dyna-V drives, 1 to 1500 hp, featuring compactness, and economy. Illustrated with photos and engineering drawings, bulletin explains construction features and advantages, and includes tables of pre-engineered drives and other tables giving horsepower capacities, belt speeds, center distances, sheave diameters. Dodge Mfg. Corp.

311 Transmission Belting—Application information on company's line of transmission belting is presented in 16-pp Bulletin S-5174. Specific types of belting for a variety of applications is illustrated and described, and technical data tables, and a selection table for drives included. The Goodyear Tire & Rubber Co.

312 Fluid Drive—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables given. Industrial Div., American-Standard.

313 Flange Mounted Drives—Bulletin 7140 contains selection data for flange mounted drives for a variety of applications. A load classification table is included, as well as tables of minimum sheave pitch diameters, load location factors, overhung load capacities. The Falk Corp.

314 Packaged Speed Control—Bulletin 20,000, 8 pp, describes a line of packaged speed control drives which incorporate power conversion equipment for converting a-c to d-c power. Advantages are detailed and component features described. The Clark Controller Co.

315 Anti-Friction Bearings—Catalog 424-B, entitled "The broadest line in the anti-friction field," an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is provided. SKF Industries, Inc.

"I wasn't at work yesterday—I couldn't find a place to park."

316 Chains, Sprockets—Catalog 757, 68 pp, on company's stock roller chains and sprockets, stresses advantages gained through roller chain use, and pictures some typical roller chain drives. Tells how to select stock roller chain drives. Provides specifications, ratings and prices. Diamond Chain Co., Inc.

317 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings. Thomas Flexible Coupling Co.

LUBRICANTS, LUBRICATION

318 Lithium Greases—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of greases, application and performance characteristics. Sinclair Refining Co.

319 Lubricant Data — Characteristics, advantages of company's line of specialized fluid and grease type lubricants are described in 32-pp Data Book 59-1. Includes sections on control of friction, use of grease type lubricants, proper applications, and recommendations for various operating conditions. Lubriplate Div., Fiske Brothers Refining Co.

320 Organized Lubrication — Benefits of organized lubrication are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. The Texas Co.

321 Product Guide — This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others. Sun Oil Co.

MAINTENANCE

322 Metal Treatment—Booklet 15 describes a metal treatment that stops rust action and prepares rusted metal for paint. Advantages are detailed and application method illustrated. Rusticide Products Co.

323 Basic-Roofing Information — "What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioriation, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

324 Painting with Aluminum—This helpful booklet describes advantages of aluminum paints, describes three basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture, and practical suggestions are given. Aluminum Co. of America.

325 Handbook on Coatings—This 1958 Coating Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Book contains information and recommendations to enable determination of specific coatings needed. Basic principle of Rust-Oleum's fish oil penetration into metal is shown. Rust-Oleum Corp.

326 Zinc Coating—This bulletin describes a special zinc coating applied as a paint to provide galvanic protection to metals. A variety of applications are detailed. Subox, Inc.

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(Begins on page 268)

327 Color Conditioning—How to put the power of color to work profitably is explained in this 28-pp color conditioning booklet. Tells how color conditioning boosts production, improves morale and promotes safety, and includes some full-color photos to illustrate "before-and-after" situations in typical plants. E. I. du Pont de Nemours & Co., Inc.

328 Aluminum Coating—An aluminum coating designed to protect against rust and corrosion which can be applied by brushing, spraying and dipping is described in this product Bulletin SP-9324. Gulf Oil Corp.

329 Industrial Steam Cleaners—Advantages of cleaning with steam are illustrated and described in this 6-pp bulletin. Applications for heavy-duty production cleaning, paint-stripping, phosphatizing are detailed and complete specifications on the portable units given. Turbo Machine Co.

330 Wooden, Aluminum Ladders—Bulletin L-94 describes company's Gold Medal and safety aluminum ladders. Contains illustrations, construction details and specifications of over 20 types of ladders including those for electricians, mechanics, etc. The Patent Scaffolding Co., Inc.

331 Cleaning Machines—Pipe and drain cleaning machines and accessories are described in 8-pp Price List 758. Illustrations as well as descriptive details and prices are included. Kollmann Mfg. Co.

332 Vacuum Units—This bulletin describes heavy-duty, portable vacuum units designed for a variety of plant housekeeping jobs. Application in removing litter, conveying or reclaiming materials, and collecting hazardous matter is covered. Invincible Vacuum Cleaner Mfg. Co.

333 Industrial Vacuum Cleaning—Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light and heavy-duty types. Recent improvements in collection and dumping methods are also covered. Spencer Turbine Co.

SLINGS, CHAINS, WIRE ROPE AND FITTINGS

335 Slings For Industry—Bulletins 5886 and 5308-R describe Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a must. Macwhyte Wire Rope Co.

336 Self-Lubricating Chain—Bulletin SLC-57 describes and illustrates exclusive, oil impregnated sintered bushing design feature of company's self-lubricating roller chain. Engineering data, dimensions and application covered. Whitney Chain Co.

337 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Crosby - Laughlin Div., American Hoist and Derrick Co.

338 Wire Rope Data—Characteristics of wire rope and its care and maintenance are covered in an interesting series of product bulletins—Bulletins 101-107. The bulletins cover abrasion, crushing, storage and lubrication, inspection, bending fatigue, localized wear, and selection information. Leschen Wire Rope Div., H. K. Porter Co., Inc.

CONSTRUCTION

339 Pole - Type Buildings—Easy steps in building pole-type industrial and other buildings are presented in this 8-pp pocket-sized booklet. Deals with uses of pressure-treated, rot and termite resistant poles and lumber. Contains practical stey-by-step guide, with diagrams, covering site location, pole setting, roof construction, splash boards, application of siding. Wood Preserving Div., Koppers Co., Inc.

340 Foundation Pipe Piles—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

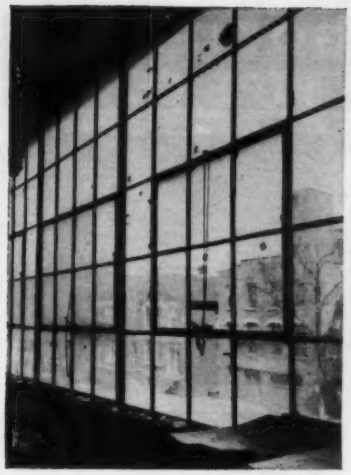
341 Open Web Joists—Standard and long span open web steel joists are illustrated and described in this 38-pp catalog. Advantages of the steel joist construction are detailed, and sections are included on design calculation, properties and dimensions. United States Steel Corp.

342 Underpasses, Conduits—Manual TL-5956 is a 16-pp book explaining practical applications of underground passageways, their design and construction. Condensed data are given, as are drawings. Armco Drainage & Metal Products, Inc.

343 Intrusion Piling—Described in 20-pp Special Report 102 is a cast-in place piling service using intrusion-prepacked concrete piles. Advantages of the cast-in-place piling are detailed, and typical construction projects are illustrated and described. Intrusion Prepakt Inc.

344 Replacement Glazing—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

345 Aluminum Fencing—Chain link fencing made of aluminum is fea-



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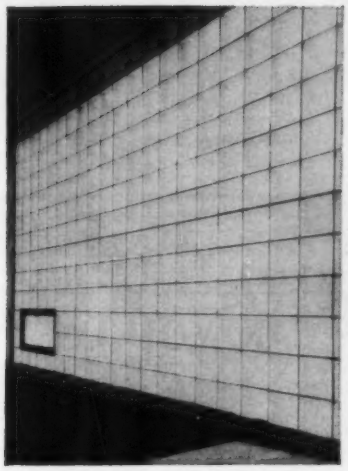

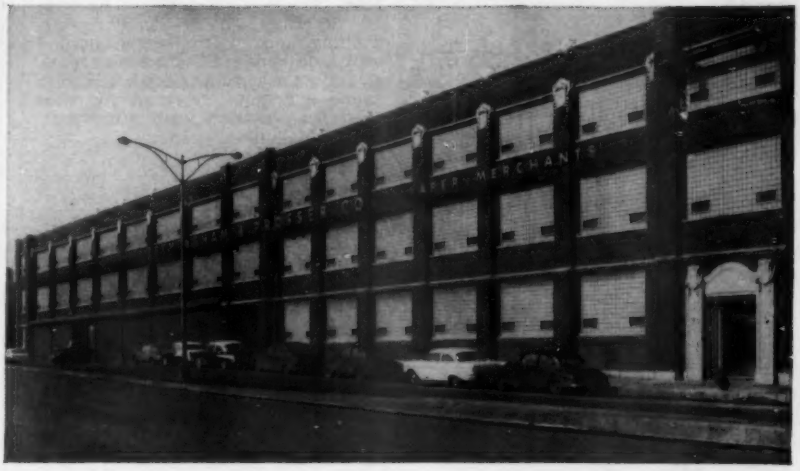

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Are your window areas an eyesore? Do they leak dust and dirt; let in too much summer heat; drain heating system efficiency in winter? Do they create glare that cause workers discomfort and inefficiency? Does constant window maintenance put a dent in your budget?

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DATA FILE

(Begins on page 268)

tured in this 12-pp bulletin. Data on corrosion resistance and durability is furnished, as well as photos of typical applications. Suggested specifications. Aluminum Co. of America.

346 Fir Plywood—This 34-pp construction guide contains full-page structural drawings providing basic information on types, grades, and applications of fir plywood. Booklet covers information on floor construction. Douglas Fir Plywood Ass'n.

347 Unit Wall Construciton—Twelve-pp Technical Bulletin UW-100-5 describes and illustrates application of company's Uniwall for complete single unit, moderate cost, wall construction in buildings of all types. The bulletin contains construction details. Natco Corp.

348 Flooring Products — Bulletin 659 describes emery-based paving, patching, and grouting materials and brick, and bonding and curing agents, as well as a special formulation with emery aggregate designed for heat resistance. Includes estimating data. Walter Maguire Co., Inc.

349 Steel Floor Plate — Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on loads. United States Steel Corp.

350 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

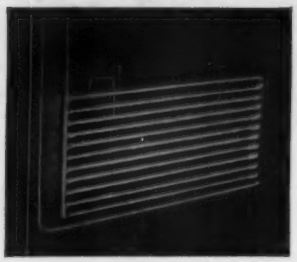
351 Steel Grating—Featured in 16-pp Bulletin 14R are company's steel grating and stair treads for a variety of industrial applications. Pictures of typical installations are included, also tables of engineering data. Kerrigan Iron Works, Inc.

352 Grating and Treads—Bulletin 2566 is a revised illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electro-forged, riveted, rectangular, diagonal, U-type and T interlocked grating and treads. Tables of safe loads and information on specifying are also included, as well as photos of applications. Blaw-Knox Co.

353 Grating, Stair Treads—Bulletin 1105, 16 pp, describes construction and design advantages of company's line of interlocked grating and stair treads. Contains detailed information, photos, drawings and engineering data on rectangular, diagonal, radial and serrated gratings, stair treads, armoring. Dravo Corp.

354 Safety Grating—Steel, aluminum and stainless steel safety grating for a variety of industrial applications is featured in illustrated 24-pp Catalog 5911. Shows typical installations, and includes complete engineering

GOOD BYE to PIPE COILS



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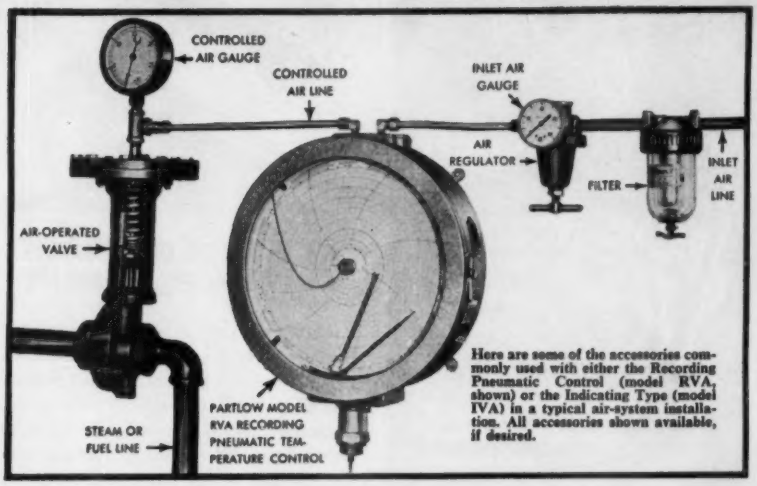
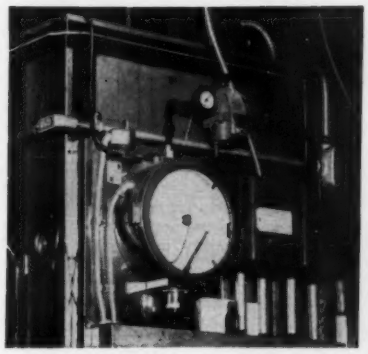


Here are some of the accessories commonly used with either the Recording Pneumatic Control (model RVA, shown) or the Indicating Type (model IVA) in a typical air-system installation. All accessories shown available, if desired.



MODEL RVA

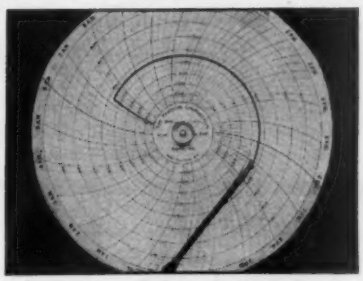
Pneumatic Recording control, installed on new steam-heated cross-flow dryer built by Lydon Bros., Hackensack, N. J.

OUTSTANDING FOR ACCURACY, SENSITIVITY AND FLEXIBILITY

The new Partlow pneumatic controls are accurate to within 1% of scale in any one of 10 ranges from –30° to 1100°F. *Exceptionally sensitive too* . . . providing positive, hair-trigger response even to fractional changes in temperature. *And flexible* . . . with throttling range adjustable anywhere from 3 to 20% of scale range.

COST LESS TO OWN AND OPERATE . . CUT "DOWN TIME" TO A MINIMUM!

Because they contain fewer parts, Partlow pneumatic controls cost less to buy: next to nothing to operate and maintain. *All elements of the same range are interchangeable*, which means they can be replaced right on the job instead of back in the factory . . . 'Down time' is reduced to a matter of minutes. And no expensive inventory of spare parts or spare instruments is ever required.



INSTANT RESPONSE

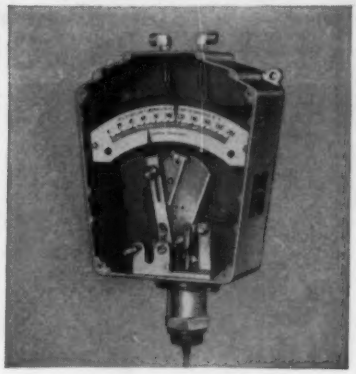
to temperature changes is a key feature of the Partlow pneumatic. Built-in bulb sensitivity teamed with advanced mechanism design means a minimum of saw-toothing on start-up and a fine line of control when the instrument has reached its throttling equilibrium.

IDEAL FOR HAZARDOUS OR 'SHOCK' LOCATIONS!

There are no delicate electronic tubes or gadgets in the Partlow pneumatic to get out of kilter, or possibly trigger an explosion. Its ruggedly simple internal mechanism is virtually shock-and vibration-proof . . provides maximum resistance to moisture, fumes, acid and all types of corrosion. Long-life and trouble-free performance are hallmarks of the pneumatics, as they are of all Partlow controls.

EXCEPTIONALLY VERSATILE TOO!

Both pneumatics — the Recording and the Indicating models — can be used in systems regulating the flow of steam, water or gas . . . or controlling other air-operated devices. Whatever the nature of the heating appliance it actuates, the chances are there's a Partlow pneumatic control to fit your requirements dependably . . . economically . . . *precisely.*



MODEL IVA (interior view)

New Partlow Pneumatic Indicating Control, with throttling range adjustable from 3 to 20%.

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DATA FILE

(Begins on page 268)

data for erection, as well as detailed load charts. The Globe Co.

355 Vinyl Industrial Tile—Illustrated and described in this product bulletin is a vinyl tile designed to solve industrial floor problems. Advantages are detailed and available colors are shown. Azrock Products Div., Uvalde Rock Asphalt Co.

356 Industrial Doors—Featured in 12-pp Form F-208 is a line of industrial and commercial doors, door hardware and operators. Photos and diagrams showing details of design and operation are included, as well as tables of dimensional and specification data. Richards-Wilcox Mfg. Co.

BOILERS AND GENERATORS

359 Bent Tube Boilers — Bulletin VF-VS2, 22 pp, describes a line of bent tube boilers designed to serve a wide variety of industries with diverse steam generating requirements. Principal data and schematic diagrams of typical installations included. Henry Vogt Machine Co.

360 Boiler Construction — Bulletin BE100 describes advantages of practical boiler construction with 2 pass design, featuring comparable results with equal heating surface, but with Continental's two-pass features—turbulent spinning gas technique-uniform heating-no refractory baffles and symmetry of furnace layout. Boiler Engineering & Supply Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 263-264.

361 Package Steam Generator—This illustrated folder describes in detail features and advantages of company's line of package steam generators. Specifications are included. Cyclotherm Div., National-U.S. Radiator Corp.

362 Hot Water Boilers—Eight-pp Bulletin 1251 describes a line of packaged automatic boilers for forced circulation hot water systems. Design features and applications are described, and dimensional data included. Orr & Sembower, Inc.

DUST, FUME CONTROL

363 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data. Pangborn Corp.

364 For Dust Collection—A collection of product sheets providing ap-

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Who Discovers the Discoverers?

"A professor can never better distinguish himself in his work than by encouraging a clever pupil, for the true discoverers are among them, as comets amongst the stars." CARL LINNAEUS

Somewhere in this mighty land of ours, a gifted youth is learning to see the light of tomorrow. Somewhere, in a college classroom or laboratory, a dedicated teacher is gently leading genius toward goals of lofty attainment. Somewhere the mind of a future discoverer—in science, engineering, government, or the arts—is being trained to transcend the commonplace.

Our nation has been richly rewarded by the quality of thought nurtured in our colleges and universities. The caliber of learning generated there has been responsible in no small part for our American way of life. To our college teachers, the selfless men and women who inspire our priceless human resources, we owe more than we will ever be able to repay.

Yet how are we actually treating these dedicated people? Today low salaries are not only driving gifted teachers into other fields, but are steadily reducing the number of qualified people who choose college teaching as a career. At the same time, classrooms are beginning to get overcrowded. In the face of this, college applications are expected to double by 1967.

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DATA FILE

(Begins on page 268)

plication suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in the Series 700 bulletins. Various models are described. Aget Mfg. Co.

365 Industrial Dust Control—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other dust filters. The W. W. Sly Mfg. Co.

366 Power Exhausters — Bulletin 58-B contains 12 pp of detailed information on company's line of power exhausters. Construction features are illustrated and described, and performance and dimensional tables are included. Cutaway views and drawings show internal construction features. Jenn-Air Products Co., Inc.

ELECTRICAL

367 Motor Protectors — Questions and answers about company's built-in, three-phase motor protectors are designed to describe features and advantages of these control units. Typical applications are illustrated in Bulletin PR-1243. Metals & Controls Corp.

368 Circuit Breakers — Bulletin 5042-A deals with company's current limiting circuit breakers on low voltage systems, operational characteristic curves and ratings. A three-dimensional sectional view opens up to show internal construction details. I-T-E Circuit Breaker Co.

369 Hydraulic-Magnetic Breakers—Bulletin 301, 16 pp, describes advantages and operation of company's hydraulic-magnetic circuit breakers. Design and construction features are detailed and time-delay curves, specifications and dimensional data included. Heinemann Electric Co.

370 Protective Relays—Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications. Federal Pacific Electric Co.

371 Panelboards — Plug-in circuit breaker panelboards for automatic protection of 120-v a-c lighting and appliance circuits are featured in Bulletin 305. Capacity data and ratings and dimension tables are included, as well as typical specifications. Frank Adam Electric Co.

372 Distribution Equipment — Detailed information on company's line of electrical distribution equipment is presented in 82-pp '59 Marketeer, Catalog M-159. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

373 Electrical Equipment Digest—Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

374 Butyl Insulation—Characteristics and advantages of butyl rubber as an insulating material for high voltage power cables are detailed in this 28-pp Bulletin 688. Chemical and electrical properties of butyl are charted, as well as such qualities as aging resistance, ozone and corona resistance, and ampere tables are included. Wire and Cable Div., National Electric Products.

375 Portable Electrical Cable—Detailed information on portable electrical cable for a variety of industrial applications is presented in this condensed catalog. Basic construction is detailed. Western Insulated Wire Co.

376 Current Trends—A series of articles dealing with electrical subjects are reprinted in Bulletin RCT 100. Subjects cover rubber insulated power cable, production testing of corona level on high-voltage cable, moisture resistance of cable insulations, polyvinyl chloride insulations, overhead cables, cable identification, statistical quality control in wire and cable manufacture and others. Rome Cable Corp.

377 Building Wire—Proper selection of electrical conductors in building construction and modernization is the purpose of 40-pp Bulletin B-1-58. Various types of wire and cables are described and detailed technical tables giving conductor designations, operating temperatures, voltage ratings, construction and other data are included. General Cable Corp.

378 Duct Systems—Described in Form 599 is a line of duct systems for power and light and communications wiring. Capacity data is furnished as well as photos of typical installations. The Wiremold Co.

379 Wiring Devices — Catalog 60, about 80 pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

380 Testing Instruments—Bulletin 19-59, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor, rotation testers, cable fault locating equipment, transformer

turn ratio test sets, corona test equipment, frequency meters, tachometers, other. Includes photos and descriptions of each type, including chief features. James G. Biddle Co.

381 **For the Missile Field**—Designing, testing and manufacturing facilities for producing electrical equipment used by the missile industry are featured in 8-pp Bulletin 2707. Condulet electrical equipment and floodlights are described. Crouse-Hinds Co.

382 **Control Batteries**—Bulletin CP-540 describes features and advantages of a line of batteries for control, switchgear and auxiliary power. Engineering details and specifications are tabulated. C & D Batteries, Inc.

383 **For Panels, Components**—Auxiliary lights, sockets and plunger switches for panels and components are featured in Bulletin L-100. Applications detailed. John W. Hobbs Corp.

LIGHTING

385 **Architectural Floodlighting** — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose models. General Electric Co.

386 **Illumination Design Data**—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. Westinghouse Electric Corp.

387 **Lamp Data**—Incandescent and fluorescent lamps are featured in this 16-pp bulletin. Selection tables list complete descriptive and electrical details. Champion Lamp Works.

388 **Communication System**—Featured in this bulletin is a transistorized communication system designed to provide communication between two or more persons or departments regardless of distance or surrounding noise conditions. Operating and equipment features are detailed. Gai-Tronics Corp.

FANS, VENTILATING

389 **Induced Draft Fans**—Catalog L-3 describes induced draft fans designed for any induced draft application for temperatures up to 800 F. Gives dimensions, capacities, as well as installation data. Fuller Co.

390 **Industrial Fans**—Bulletin 690-A, 12 pp, contains dimensions and application and performance data on direct connected fans for general and system ventilation and power roof ventilators, with air deliveries to 103,200 cfm. Design features and typical installations illustrated. Propellair Div., Robbins & Myers, Inc.

391 **Air-Moving Equipment**—Bulletin DB 45-58, 20 pp, contains detailed

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8	What It Costs to Modernize Small Industrial Power Plants—24-page reprint of series of articles by H. D. Fisher from 1957 issues, giving six case studies of plants from 25,000 to 50,000 lb of steam per hour capacity.	1.00
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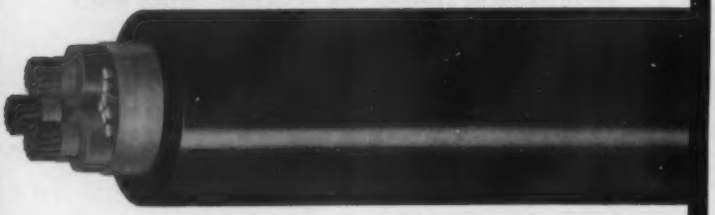

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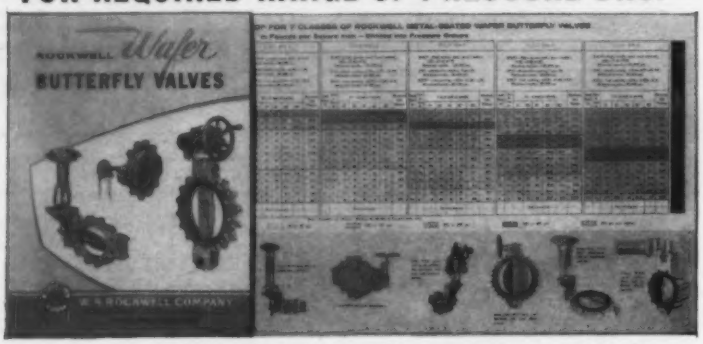

This new Bulletin No. 583 gives all the facts to help you select just the size and construction of valve for your air, gas or liquid lines. Illustrations—charts—tables are arranged in a practical, easy-to-use manner. Write for your copy.

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W. S. ROCKWELL COMPANY

Valves—Butterfly · Slide · Diaphragm · Special

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DATA FILE

(Begins on page 268)

information on company's line of roof ventilators, bifurcators, axial flow vent sets, and air jets. Bonded performance ratings are listed on tables, and dimensional data included. De-Bothezat Fans Div., American Machine and Metals, Inc.

392 Ready Units—Catalog 515 provides 28-pp on complete, ready-to-run centrifugal fan equipment. Capacities 400 to 13,000 cfm, v-belt and direct drive units. Dimensions and capacities included. Clarage Fan Co.

TOOLS, MACHINE SHOP

393 Pipe Tools—Ordering and application information on Rigid pipe tools is provided in 16-pp illustrated Catalog 7596R-6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives. The Ridge Tool Co.

394 Industrial Wrenches, Hand Tools—Tools for production lines, maintenance work and product servicing are featured in a 156-pp Industrial Catalog 58-I. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and rollcabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, etc. Snap-on Tools Corp.

395 Portable Electric Tools—Form 10 features a complete line of portable electric tools including drills, screw-drivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, and forged tools. The Black & Decker Mfg. Co.

396 Powder Actuated System—Two booklets cover applications of a powder actuated fastening system. One booklet shows how it can be used for plant maintenance — fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, etc. The second booklet indicates the correct fastening and charge to use to fasten materials to concrete or steel. Ramset Div., Olin Mathieson Chemical Corp.

397 Masonry Bits—Catalog M B C-56 describes carbide-tipped masonry bits for drilling holes in tile, brick, concrete, granite or any other kind of masonry. Specifications are included, as well as a table giving chuck and shank requirements to adapt to different electric or pneumatic hammers. New England Carbide Tool Co., Inc.

398 Soldering Aluminum—Detailed information on soldering aluminum is presented in this reference bulletin. Includes data on soldering fluxes, irons and flames, and gives information on soldering methods, such as hot plate, dip, furnace, friction, glass fiber brush and ultrasonic operations. Reynolds Metals Co.

399 Data for the Shop—"Fluids and Facts for Metal Working" is a

pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

METALS

401 Aluminum and Steel Data—Comprehensive selection data on aluminum and steel available in stock for almost every application is presented in this 242-pp buying guide. Necessary weights, dimensions and descriptive data are tabulated. Individual sections cover structural shapes, construction products, plates, sheets, hot rolled bars, cold finished bars, alloy and tool steel, tubing, stainless steel, aluminum, others. Joseph T. Ryerson & Son Inc.

402 Molybdenum in Steel Castings—This 36-pp brochure on the role of molybdenum in steel castings for industrial equipment discusses hardenability, tensile properties, fatigue, hardness, wear and impact resistance, machinability, and weldability of cast steels. Climax Molybdenum Co.

403 Standard Alloys—Catalog 18 is designed to facilitate selection of most suitable alloy for specific service conditions: corrosion, temperature extremes, high strength, purity protection, electrical properties, wear, heat transfer, workability, and spring properties. Includes sand and centrifugal castings, welding materials, average properties, forms available. The International Nickel Co., Inc.

PUMPS, COMPRESSORS

404 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

405 Centrifugal Pumps — Catalog A-156 describes and illustrates company's line of double-suction single-stage centrifugal pumps. Features are detailed, and cross section drawing and construction details are included. C. H. Wheeler Mfg. Co.

406 Liquid Ring Pump—Bulletin 725.6 describes a light weight, self-priming, portable or permanent liquid ring pump for transfer and similar jobs, which handles air alone, liquid alone or any air-liquid combination. Specifications, performance and construction data. Gould's Pumps, Inc.

407 Rotary Blowers, Pumps—Full details on continuous-service rotary positive pressure blowers, gas and vacuum pumps are included in 20-pp Bulletin S65C. Contains photos and cut-away drawings, showing construction features, as well as explanation of operating principles and a list of applications. Sutorbilt Corp.

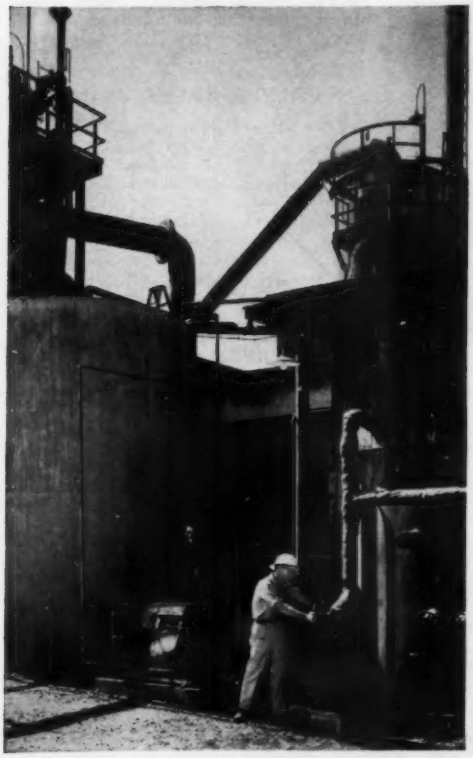
408 Rotary Pumps—The positive displacement principle upon which these rotary pumps operate is illustrated and described in 34-pp Bulletin Section K. Discusses rotary pump fundamentals and includes detailed engineering data and selection tables. Viking Pump Co.

409 Single Suction Pumps — Ball bearing single suction pumps are illustrated and described in 24-pp Bulletin 976-G. General data and specifications are included, as well as rating tables, outline dimensions, sectional reference drawings. Buffalo Pumps, Div. Buffalo Forge Co.

410 Centrifugal Pumps — Bulletin 5006 describes a line of alloy metal pumps for high-speed applications. Design features are illustrated and described, and specifications, dimensional data, and a performance chart included. Dorr-Oliver Inc.

411 Oil-Free Compressors — Described in Bulletin 202-B is a line of compressors designed to compress air or gas entirely free of any oil or oily vapors due to lubricants. A large cutaway view illustrates component features. Pennsylvania Pump and Compressor Co.

412 Horizontal Compressors—Eight-pp Bulletin HAC-40 describes company's Class RX horizontal, single-stage air compressors. Keyed cutaway illustrations show design and construction features. Lubrica-



Tanks supply feedwater to the boilers which produce steam for the manufacture of sulphuric acid. Water clarifier tank is on right, treated water storage tank on left.

Quick case history—reading time 47 seconds

How Hagan Coagulant Aid ended carryover problems at Pennsalt Acid Plant

No extra feeding equipment needed

Pennsalt Chemicals Corporation's plant at Calvert City, Ky., had a serious floc carryover problem when clarifying with alum and activated silica. Filters clogged rapidly and carryover of floc to the boiler was highly undesirable.

Pennsalt engineers investigated the effect of various polyelectrolytes and recommended changing to alum and Hagan Coagulant Aid No. 7. After more than 18 months of this treatment, the plant reports these benefits:

- **elimination of the carryover problem**
- **reduction in overall chemical cost**

And, a great benefit from Pennsalt's point of view, the switch to Hagan Coagulant Aid was accomplished without the necessity of adding feeding equipment.

Hagan has a number of Coagulant Aids, all of which are easy to handle, and may be fed either dry or in solution. Many are approved for use in clarification of drinking water. To find out which of these Aids is best suited to solve your water clarification problem, write for Bulletin 410-12-2 describing Hagan Coagulant Aids.

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for every power measurement

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2 current element	100/200/500	5 or 10
3 current element	100/200/500	5 or 10
4 current element	100/200/500	5, 10 or 20
DC		
2 current element	100/200/500	5, 10 or 20
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What They Are—Ask for Catalog Section 33.
What You Can Do With Them—Ask for Bulletin 939A.

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Cedar Falls, Iowa, U.S.A. In Canada, it's "*ROTO-KING*" pumps
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DATA FILE

(Begins on page 268)

tion, controls available and standard equipment are covered. Gardner-Denver Co.

413 Air Compression for Industry—This is a 24-pp combination data book and catalog on all types of air compressors from ⅓ hp to 20 hp. Discusses factors to be considered in the use of air for each operation, and points out importance of determining how much usuable air is needed. The Wayne Pump Co.

414 Oil-Free Compressors—Heavy-duty industrial oil-free compressors are featured in 12-pp Bulletin A-44. Component parts are illustrated and described, and internal construction is shown on cutaway. Joy Mfg. Co.

HOSE

415 Industrial Hose—Bulletin IH-10 features application and selection data on industrial hose, including braided, horizontal braided, wire braided, wrapped and braided, wire woven, smooth bore and rough bore. Descriptions of each type of hose are followed with application information. The Gates Rubber Co.

416 Industrial Teflon Hose—Bulletin 2140 describes advantages of Teflon and its applications in a variety of industries where resistance to temperature, pressure, corrosion and contamination is desired. Teflon hose specifications are included, as well as assembly procedure. Titeflex, Inc.

VALVES, TRAPS, PIPING

418 Valve Performance Facts—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

419 Gate Valves—Money-saving advantages of King-Clip gate valves are described in Circular 561. Illustrated with cutaway drawings and photos, bulletin gives detailed data, tables of steam and water-oil-gas pressure ratings. Lunkenheimer Co.

420 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, water valves, slide valves. W. S. Rockwell Co.

421 Pressure-Reducing Valve—Bulletin J-160 describes features and advantages of company's pressure reducing valves for dead end shut-off and positive pressure regulation. Operation details are shown on cutaway view, and recommended capacities given on tables. OPW-Jordan.

422 Full Flow Valves—Form 188 describes a line of bronze globe and

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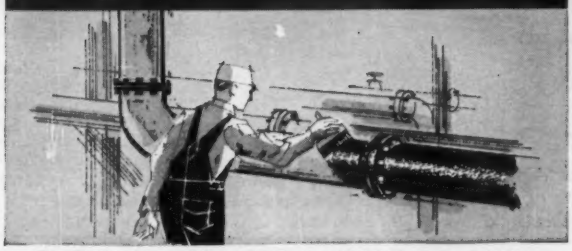

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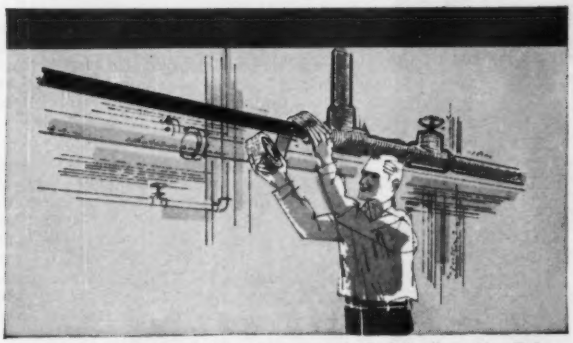

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DATA FILE

(Begins on page 268)

angle valves with full area seat opening and accurate throttling control. Cutaway views showing component features are included, as well as dimensional diagrams and data. The Wm. Powell Co.

423 **Stainless Steel Valves**—Corrosion resistant stainless steel valves are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive attack of chemicals and atmospheres are detailed. Jenkins Bros.

424 **On Steam Traps**—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, repairs. Armstrong Machine Works.

On pages 263-264 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in the ads.

425 **Impulse Steam Traps**—Bulletin T1744 describes a line of impulse steam traps designed for light condensate load requirements. Operation is detailed, and capacities, dimensions tabulated. Yarnall-Waring Co.

426 **Plastics in Piping**—Handbook C-159, 16-pp, describes technology of plastic piping systems, installation and coupling methods, standards for plastic pipe. Provides temperature and working pressure chart for valves, and a table of service recommendations showing effects of 280 chemicals on five plastics used in manufacturer's valves. Gives data on valves, fittings. Chemtrol.

427 **Reinforced Plastic Pipe**—Detailed information on characteristics and applications of reinforced plastic pipe is presented in this 16-pp bulletin. Temperature and pressure curves are included, along with dimensional data and diagrams. Amercoat Corp.

428 **UPVC Pipe, Fittings**—Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in 24-pp Booklet TTP-119. Also gives specifications for threaded and socket types of UPVC fittings, valves and flanges, of normal and high-impact material. Tube Turns Plastics, Inc.

429 **Expansion Joints** — Features and advantages of company's line of

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You can get trouble-free welds between cast iron and mild steel in all your jobs – with Ni-Rod "55" Electrode; available from most jobbers.

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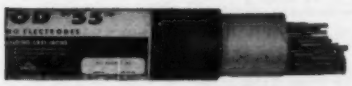

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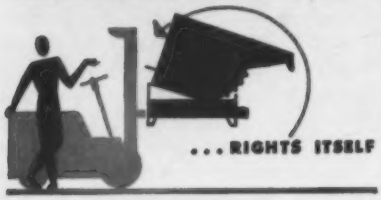

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DATA FILE

(Begins on page 268)

expansion joints and flexible couplings are illustrated and described in 12-pp Form AD-137. Standard dimensions and other engineering data are included. The Garlock Packing Co.

430 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure applications, for vacuum and very low pressures, etc. Snap-Tite, Inc.

431 Bellows Design Guide—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Flexonic Corp.

432 Self-Cleaning Strainer—Bulletin 1210B describes self-cleaning, semi-steel pipeline strainers in sizes from ¼ through 3 in., featuring high strength construction of the bodies, long tapered screen socket, perforated heavy-gage screen. Includes dimensions, weights. Sarco Co., Inc.

FILTERS, FILTERING

433 Filters, Strainers — Industrial Catalog 1058, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filers, dry type air filters, air separators, and metal edge strainers shown. Purolator Products, Inc.

434 Filtration Equipment — Eight-pp Bulletin GEO-506 describes filtration equipment for micronic clarification of all types of fluids; lubricating and fuel oils; liquid chemicals and petro-chemicals; compressed air, carbon dioxide, and other gases; hydraulic fluids; electroplating solutions. Commercial Filters Corp.

435 Activated Carbon — Absorbency characteristics of activated carbon and its application in filtration, purification, refining and reclamation processes are discussed in this 10-pp bulletin. Typical uses of granular and pulverized activated carbon are illustrated. Activated Carbon Div., Pittsburgh Coke & Chemical Co.

INSTRUMENTS, CONTROLS

436 Motor Speed Controls—Eight-pp. Form 927B features motor speed controls for adjustable-speed operation of d-c motors from a-c lines. Applications and advantages are listed, operating principle is detailed. General Radio Co.

437 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides in-

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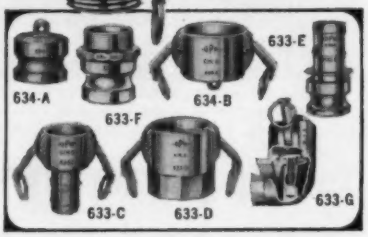

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You can install Reznor gas unit heaters in your warehouse and storage buildings, set the thermostat and forget them. These completely automatic units, operating without any attention, will hold the temperature at any point you select. If rust or mold is a problem in your plant, ask your Reznor distributor for specific recommendations on how to stop it. For complete details on Reznor equipment for solving any plant heating problem, write for your free copy of "Modern Heating".

Look for Reznor under "Heaters-Unit" in the Yellow Pages

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WORLD'S LARGEST-SELLING DIRECT-FIRED
UNIT HEATERS

Reznor Manufacturing Company, 91 Union Street, Mercer, Pa.

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DATA FILE

(Begins on page 268)

formation on recording, indicating non-indicating controls; thermometers. The Partlow Corp.

438 Controls for Automation—Automation Controls Catalog, 44 pp, groups together a wide selection of automatic controls most commonly used in designing automatic systems. Includes such items as counting devices, switches, electric valves, actuators, relays, limit controls, time switches and accessory equipment which can be used as building blocks in selecting components for tailoring system. General Controls Co.

439 Automatic controls—Catalog 26 comprises 52 pages which describe and illustrate electric thermostats, pressure controls, humidistats, motor-operated valves, temperature regulators, motor operators, unit ventilator controls, hot water controls, electronic controls, control centers and accessories. Operational and application data is incorporated with the description of each control component. Barber-Colman Co.

440 For Limited Panel Space — Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale 20 in. long. The Liquidometer Co.

441 Strip Chart Recorder—Detailed information on a small, compact strip chart recorded is presented in this product data sheet. Specifications are included, as well as price and ordering data. Rust Industrial Co., Inc.

442 Graphic Instruments — Featured in 16-pp Catalog 657 is a line of graphic instruments designed to serve a variety of industrial measuring applications. Complete descriptive details on various types of recorders and accessories included, as well as ratings. The Esterline-Angus Co., Inc.

443 Meters, Regulators, Valves—Bulletin C-5000, 28 pp, describes and illustrates meters, regulators and valves for a wide range of services. They include gas meters, gas pressure regulators, industrial meters, water meters. Information includes application suggestions, specifications and references to more detailed product literature. Valve section provides operational data, shows major valve patterns in Rockwell-Nordstrom line, explains design. Rockwell Mfg. Co.

444 Dial Thermometers — Catalog 205 contains 12 pp of illustrated data on features and characteristics of a line of dial thermometers for industrial applications. Complete dimensional and specification data is included. United States Gauge, Div. American Machine and Metals, Inc.

445 Gages, Needle Valves—Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. Jas. P. Marsh Corp.

446 Laboratory Supplies—This 12-pp price list announces the latest prices for a wide range of laboratory supply items, including water analysis sets, conductivity equipment, colorimetric comparators, laboratory glassware and supplies, chemical reagents, and company's photometer with replacement accessories. Betz Laboratories, Inc.

SAFETY, SANITATION

447 Four-Way Concentrate — The four ways in which this active concentrate works in the maintenance field are illustrated and described in this information bulletin. Shows how the product cleans, disinfects sanitizes and deodorizes to result in substantial savings. Sugar Beet Products Co.

448 Insect Control — Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles. West Chemical Products, Inc.

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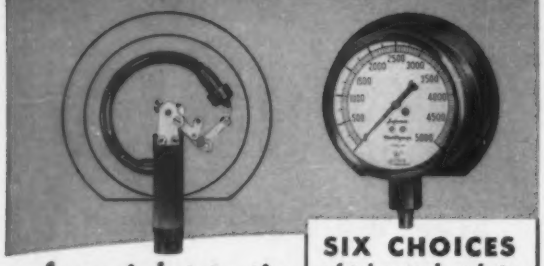

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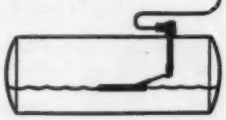

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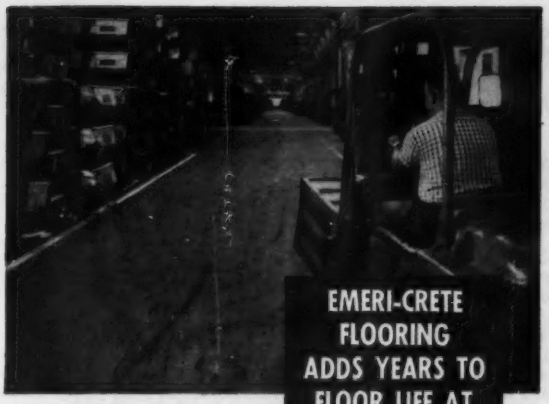

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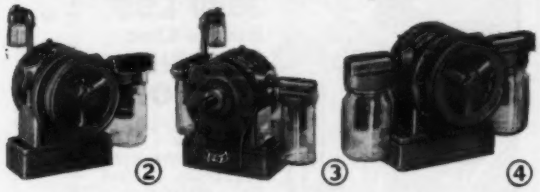

Above (1) is basic Model 1550 Vacuum Pump—(one of 13 sizes). For active customers, Gast builds this model in dozens of variations. Specific needs are met for vacuum, pressure, lubrication, drive and type of service.

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More than that, 53 individual anchors *permanently bond* each Ancor Plate to the concrete floor base. This cuts maintenance costs...and helps assure the best floor possible.

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(Begins on page 268)

449 Safety Equipment — Featured in 28-pp Catalog 58 is a line of industrial safety equipment, including head protection, first aid, respiratory equipment, materials handling equipment, and miscellaneous items. Includes descriptive details, illustrations, and complete specifications and dimensional data. E. D. Bullard Co.

MATERIALS HANDLING

450 Electric Hoists—Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

451 Rugged Little Hoist—Twelve-pp Bulletin 158-E describes the Lodestar, a light weight but heavy duty, small electric hoist with push button control. Discusses low maintenance, safety, other advantages offered, and covers design features. Specifications and dimensions are given for both single- and double-chain models shown. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

452 Electric Hoists — Twelve-pp Bulletin DH 133D describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

453 Sheet and Coil-Lifters—Bulletin SL-30, 16 pp, illustrates and describes various types of standard and semi-special lifters for one-man or automatic handling of sheet and coil stock. Advantages and design features are detailed and tables listing dimensions included. Cullen-Friestedt Co.

454 Feeders and Conveyors—Catalog 930 is a 96-pp book covering electric vibrating feeders and conveyors. Controls, installation methods, operating principles, and individual unit specifications are included. Also presented are other vibrating equipment such as barrel packers and coolers and dryers, as well as magnetic separators and bin level indicators. The Jeffery Mfg. Co.

455 Conveyor System—Bulletin 159 describes company's power and free overhead conveyor featuring selector dispatch head. Construction and operating features are illustrated, typical layout is diagrammed, and specifications included. Columbus McKinnon Chain Corp.

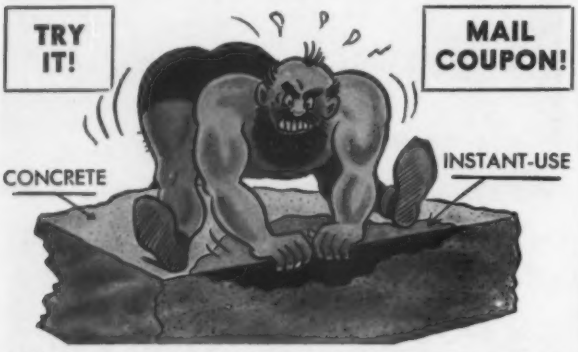
456 Automatic Bulk Handling—Bulletin 531, 12-pp, on new techniques for automatic bulk handling describes pneumatic conveying methods in integrated manufacture. Describes two polyethylene handling installations to show how a system approach to air conveying solves complex handling problems. Dracco Div., Fuller Co.

457 Adjustable Ramps—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated—the Adjust-A-Dock, installed in the loading platform or at its level, and one installed at ground level. Rowe Methods, Inc.

458 Vertical Transportation — Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various types of elevators and escalators for a variety of commercial and industrial applications are described and illustrated. Otis Elevator Co.

459 Self-Dumping Hopper — Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described in detail. Roura Iron Inc.

460 Material Handling—Sixteen-pp Catalog 90 covers a diversified line of corrugated steel boxes, skids and pallets for unit load handling. Design and application ideas to help speed production and solve specific handling problems are presented. The Union Metal Mfg. Co.



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All you need to do is circle the item numbers of those you want. Then fill in your name, job title, company name and address—and mail the card.

You may also use the Reader Service Cards to request information on products described, or literature mentioned in the ads—just circle the number below the ad.

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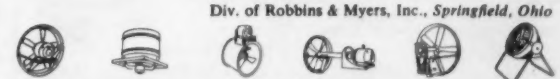

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(Begins on page 268)

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466 **Guide to Shelving**—To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for planning of stockrooms. Deluxe Metal Furniture Co. Royal Metal Mfg. Co.

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applications are included, as well as specifications, mixer capacity tables, photos. Mixing Equipment Co., Inc.

472 Equipment Selector Charts—Bulletin CE-50, 20 pp contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps. Amerace Corp., American Hard Rubber Div.

473 Water-Cooled Stoker — Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Co.

474 Air Pollution Control—Featured in this 8-pp bulletin are solutions to air pollution control and heat recovery through catalytic oxidation. Typical problems and solutions in organic finishing and drying, chemical industry, oil refinery industry, and food processing industry are detailed, and package catalyst units for all types of applications are described. Oxy-Catalyst, Inc.

475 Air Conditioning Units—Bulletin 786 contains 54 pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing the physical size based on air capacity and face velocity requirements, while succeeding pages concern themselves with heating and cooling requirements, control. American Air Filter Co., Inc.

476 No-Frost Refrigeration—Twelve-pp Bulletin 105 describes with diagrams and photos method used for food freezing, chilling and warehouse refrigeration without frost or ice formation. Advantages given. Niagara Blower Co.

477 Magnetic Equipment—Product and application information on a line of magnetic separators, magnetic automation units, and vibratory equipment is presented in 47-pp pocket-size Booklet B-575. Descriptive information and photos of typical installations. Eriez Mfg. Co.

Postage-free cards for ordering catalogs are on page 264. You may also use the cards to order literature mentioned in the ads.

478 Coagulant Aids—Featured in this product bulletin is a line of coagulant aids designed to improve floc formation in clarifying and softening water. Advantages are detailed and typical applications described. Calgon Co., Div., Hagan Chemicals & Controls, Inc.

479 Consulting Service — Advantages of company's consulting service are detailed in 8-pp Bulletin 5006-A. How the service is qualified to solve problems concerning scale and corrosion control in boilers, cooling systems, and process waters is discussed. Dearborn Chemical Co.

480 Fighting Corrosion With Corrosion—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures. Electro Rust-Proofing Corp.

481 Fluorescent Test Kit—Featured in Form 1670 is a fluorescent penetrant test kit designed to find cracks, pores, leaks in all sorts of materials. Complete application details are given. Magnaflux Corp.

482 Piston Packing — Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions. Darling Valve & Mfg. Co.

483 Thermoplastic Polymer — Information on the properties of Penton, thermoplastic polymer, is presented in this 6-pp brochure. Lists mechanical, electrical and chemical properties and describes molding methods. Hercules Powder Co.

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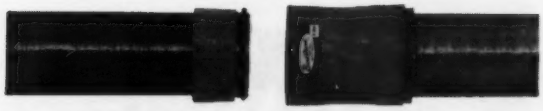

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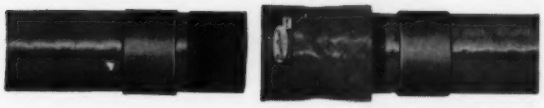

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(Begins on page 268)

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472 Equipment Selector Charts — Bulletin CE-50, 20 pp contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps. Amerace Corp., American Hard Rubber Div.

473 Water-Cooled Stoker — Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Co.

474 Air Pollution Control — Featured in this 8-pp bulletin are solutions to air pollution control and heat recovery through catalytic oxidation. Typical problems and solutions in organic finishing and drying, chemical industry, oil refinery industry, and food processing industry are detailed, and package catalyst units for all types of applications are described. Oxy-Catalyst, Inc.

475 Air Conditioning Units—Bulletin 786 contains 54 pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing the physical size based on air capacity and face velocity requirements, while succeeding pages concern themselves with heating and cooling requirements, control. American Air Filter Co., Inc.

476 No-Frost Refrigeration—Twelve-pp Bulletin 105 describes with diagrams and photos method used for food freezing, chilling and warehouse refrigeration without frost or ice formation. Advantages given. Niagara Blower Co.

477 Magnetic Equipment—Product and application information on a line of magnetic separators, magnetic automation units, and vibratory equipment is presented in 47-pp pocket-size Booklet B-575. Descriptive information and photos of typical installations. Eriez Mfg. Co.

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478 Coagulant Aids—Featured in this product bulletin is a line of coagulant aids designed to improve floc formation in clarifying and softening water. Advantages are detailed and typical applications described. Calgon Co., Div., Hagan Chemicals & Controls, Inc.

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480 Fighting Corrosion With Corrosion—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures. Electro Rust-Proofing Corp.

481 Fluorescent Test Kit—Featured in Form 1670 is a fluorescent penetrant test kit designed to find cracks, pores, leaks in all sorts of materials. Complete application details are given. Magnaflux Corp.

482 Piston Packing — Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions. Darling Valve & Mfg. Co.

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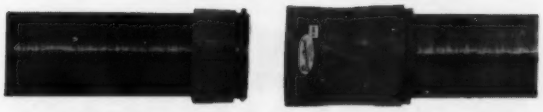

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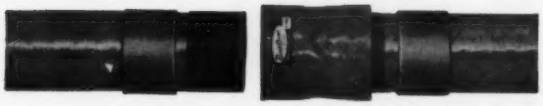

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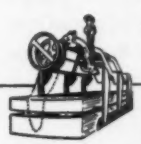

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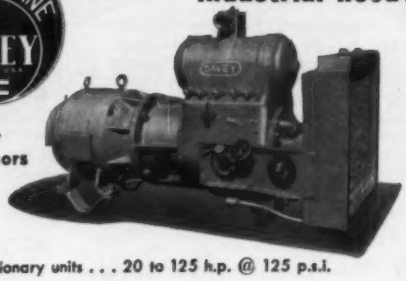

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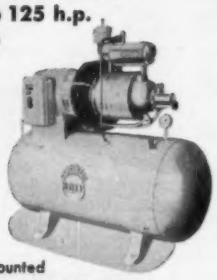

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Ackermann Mfg. Company 289
Aget Manufacturing Co. 294
Air Preheater Corp. 69
Airtemp Div. Chrysler Corp. 225
Alan Wood Steel Co. 246
Aluminum Company of America 209, 237
Amerace Corporation
American Hard Rubber Div. 247
Amercoat Corporation 293
American Chain & Cable Co.
Wright Hoist Division 65
American Engineering Co. 269
American Hoist & Derrick Co. 250, 287
American Machine and Metals, Inc. 174
American Standard Industrial Div. 78-79
Anchor Post Products, Inc. 68
Armco Drainage & Metal Products 223
Armstrong Machine Works 243
Azrock Floor Products Div. 47

Barber-Colman Company 252
Barnes & Jones, Inc. 50
Bayley Blower Company 199
Bell & Gossett Company 89
Betz Laboratories, Inc. 6-7
Black & Decker Mfg. Co. 215, 285
Blaw-Knox Company 257
Bowser, Inc. 37, 287
Buffalo Forge Company 24
Bullard Company, E. D. 214
Bulldog Electric Products Co. 153, 155
Butler Manufacturing Co. 38-39, 260

C & D Batteries, Inc. 224
Champion Lamp Works 46
Chemtrol 272
Chisholm-Moore Hoist Div. 48
Clarage Fan Company 56
Clark Controller Company 219
Climax Molybdenum Co. ..... Back Cover
Colorado Fuel & Iron Corp. 294
Columbus McKinnon Chain Corp. 211
Combustion Engineering, Inc. 72
Commercial Filters Corp. 213
Connor Engineering Corp. 202
Crane Company 179
Crouse-Hinds Company 41
Cullen-Friestedt, Inc. 293

Darling Valve & Mfg. Co. 206
Davey Compressor Company 294
Dean Thermo-Panel Coil Div. 274
Dearborn Chemical Company 29
De Bothezat Fan Division
American Machine and Metals, Inc. 174
Deluxe Metal Furniture Co. 59
Diamond Chain Company 181
Dodge Mfg. Corporation 186, 187
Dorr-Oliver, Inc. 62
Douglas Fir Plywood Assn. 16
Dracco Div. of Fuller Co. 158
Dravo Corporation 261
Du Pont de Nemours & Co., E. I. 157, 221

Electro Rust-Proofing Corp. 244
Eriez Mfg. Company 252
Essex Conveyors, Inc. 254
Esso Standard Oil Co. 67
Esterline-Augus Co., Inc. 282

Falk Corporation 161
Faultless Caster Corporation 233
Federal Pacific Electric Co. 255
Fiske Bros. Refining Co. 30
Flexonics Corporation 11
Flexrock Corporation 290
Foster Company, Benjamin 175
Foster Company, L. B. 276

Gai-Tronics Corporation 220
Gardner-Denver Company 200, 201
Garlock Packing Company 172-173
Gast Mfg. Corporation 289
Gates Rubber Company 49
General Cable Corporation 90-91
General Controls Company 183
General Electric Company
Apparatus Division 25, 162-163, 207, 232
Circuit Protective Devices Div. ..... 33 thru 36
Lamp Division 167
General Radio Company 210
Globe Company
Products Division 240
Goodyear Tire & Rubber Co., Inc. 1
Goulds Pumps, Inc. 197
Graphic Systems 236
Greene, Tweed & Co. 276
Grinnell Company 5
Gripholst, Inc. 290

Hagan Chemicals & Controls, Inc. 281
Harnischfeger Corp. 191-192
Heinemann Electric Company 193
Homestead Valve Mfg. Co. 82
Hunt Valve Company 262

ILG Electric Ventilating Co. 188-189
Ingersoll Rand Company 64
International Nickel Co., Inc. 285
Invincible Vacuum Cleaner Mfg. Co. 249
ITE Circuit Breaker Co. 176-177

Jeffrey Mfg. Company 53
Jenkins Bros. 45
Jenn-Air Products Co. 195
Johns-Manville 17
Jordan Corporation 286
Joy Manufacturing Company 23

Kerrigan Iron Works, Inc. 284
Kollman Mfg. Company 222
Koppers Company, Inc. 182

Lennox Industries, Inc. 205
Leschen Wire Rope Div.
H. K. Porter Co., Inc. 194
Link-Belt Company 51
Liquidometer Corporation 288
Logansport Machine Co., Inc. 251
Louis-Allis Company 80-81
Lubriplate Division
Fiske Bros. Refining Co. 30

Magnaflux Corporation 292
Maguire Company, Walter 289
Mahon Company, The R. C. 10
Marsh Instrument Co. 288
Mixing Equipment Co., Inc. 238
Morrell Company, J. W. 283

Natco Corporation 227
National Electric Products Div.
H. K. Porter Co., Inc. 170-171
National Lighting Bureau 276
New England Carbide Tool Co. 256

Otis Elevator Company 18-19
Owatonna Tool Company 230
Oxi Corporation 292
Oxy-Catalyst, Inc. 198

Page Fence Association 274
Pangborn Corporation 259
Partlow Corporation 275

Pass & Seymour 242
Patent Scaffolding Co. 253
Pennsylvania Pump & Compressor Co. 248
Pittsburgh Coke & Chemical Co. 241
Pittsburgh Corning Corp. 166, 273
Pittsburgh Screw & Bolt Corp. 278
Porter Company, Inc., H. K.
Leschen Wire Rope Div. 194
Porter Co., Inc., H. K.
National Electric Products Div. 170-171
Powell Company, William 26-27
Propellair Division
Robbins & Myers, Inc. 291
Puritan Chemical Company 57
Purolator Products, Inc. 20

Ramset Fastening System 44
Remington Arms Company, Inc. 229
Reynolds Metals Company 61, 218
Reznor Manufacturing Co. 287
Ridge Tool Company 283
Robbins & Myers, Inc.
Hoist & Crane Div. 72
Rockwell Company, W. S. 280
Rockwell Mfg. Company ..... 73 thru 76
Rohm & Haas Company 3
Rome Cable Corporation 117, 149, 151
Roura Iron Works, Inc. 286
Rust Industrial Company 284
Rusticide Products Company 212
Rust-Oleum Corporation 54-55
Ryerson & Son, Inc., Joseph T. 235

Sarco Company, Inc. 168-169
Screw & Bolt Corp. of America 278
Sexauer Mfg. Co., J. A. 254
Sinclair Refining Company 77
SKF Industries 296
Sly Mfg. Co., W. W. 234
Snap-on Tools Corp. 46
Spencer Division
Metals & Controls Corp. 239
Spencer Turbine Company 208
Square D Company ..... 2nd Cover, 63, 3rd Cover
Standard Oil Co. (Indiana) 203
Subox, Inc. 216
Sugar Beet Products Co. 196
Sun Oil Company 43

Texaco, Inc. 14-15, 245
Thomas Flexible Coupling Co. 4
Titeflex, Incorporated 271
Tube Turns Plastics, Inc. 285
Turbo Machine Company 291

Union Asbestos & Rubber Co. 32
Union Metal Mfg. Co. 226
United States Gauge 231
United States Steel Corp. 12-13, 217

Veeder Root, Inc. 204
Vogt Machine Co., Henry 52
Viking Pump Company 282

Wayne Pump Company 256
West Chemical Products, Inc. 31
Western Insulated Wire Co. 280
Westinghouse Electric Corp. ..... 8-9, 70-71, 85 thru 88, 184-185, 267
Wheeler Mfg. Co., C. H. 253
Whitney Chain Company 190
Wickwire Spencer Steel Div. of CF&I 294
Wide-Lite Corporation 236
Wiremold Company 260
Wright Hoist Division
American Chain & Cable Co. 65

Yale & Towne Mfg. Co. 164-165
Yarnall-Waring Company 28

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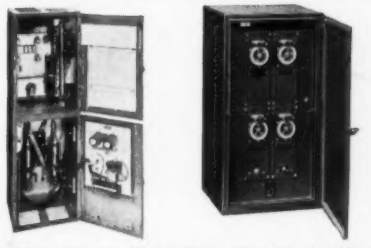

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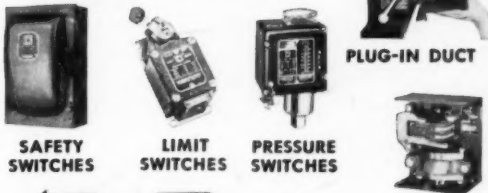

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7

JULY, 1959

Plant Engineering

IN THIS ISSUE

Incinerator and Waste-Heat Boiler Team Up To Save Money 86
Why Grounding Pays! 88
Two New Suspensions for Materials Handling Vehicles ... 91
"Instant" Steel—Will It Aid Maintenance? 92
Construction Cost Estimating I—Concrete Foundations 96
Small Plant Disaster Plan—Planning, Practice Pay Off in ANY Emergency 101
Materials Weighed While in Motion 102
How About Flame Cutting With Natural Gas? 105
Case Studies: Plastic Belts—Nylon and Leather Prove Rugged Team 108
Smith Paints Metal First—Then Forms It! 110
Odors Out!—Fresh Air In! Activated Charcoal Filters Did the Trick 112
Scrap Handling Programs—How To Plan Them for Profits 114
Similar Product, Similar Buildings, Different Layouts 117
Expanding Handling—Easy With Air Systems 118
Spotless Facilities—Pronto! Janitor Training Produces Results 120
This Pipe Insulation Had To Be Waterproof 124
AIPE Installs Officers 126
New High in Industrial Hospitality 128

REGULAR DEPARTMENTS

'Round About With the Editors 2
Bulletins and Catalogs 23
Backtalk and Forethoughts 30
Plant Engineers' Digest 38
Operation and Production 52
Court Decisions 75
What's Just Ahead in This Issue? 85
News from the Plants 130
New Plant Construction 136
New Products and Processes 144
Review of New Books 180
Data File of Commercial Literature 190
Advertisers' Index 217

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